The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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CHRISTMAS HOLIDAYS.

The offices of THE CHEMICAL AGE *will be closed on Wednesday and Thursday, December 25 and 26. All communications for the issue of December 28 should reach the Editor not later than Saturday, December 21.*

Not Enough Physicists

MR. H. T. TIZARD, who will be remembered in the chemical industry as Secretary of the Department of Scientific and Industrial Research, a post he recently vacated to become Rector of the Imperial College of Science and Technology, has some plain words to say in the November number of the *Journal of Careers* on the new openings in industry that await the physicist. Until recently, he points out, there was but little appreciation of the value to industry of a higher education in physics. The chemist has for some time, more especially since the war, been in some sort of demand. There are few chemical manufacturing firms of any account that do not employ research chemists. Analytical chemists, too, are sought for the control of processes. But the physical control of manufacturing processes is still, in Mr. Tizard's view, far from being what it ought to be, and there is widespread ignorance of the kind of control that is made possible by the application of modern physical knowledge. No one to-day, he adds, imagines that air transport, wireless communication, or the production and distribution of electrical power can progress without the help of physicists in large numbers, but few people are enlightened enough to apply the same ideas to the older industries, where he considers the physicist to be as badly wanted.

Mr. Tizard, however, sees some hope in the fact that the attitude of the industrialist towards the scientific man is changing, and he confidently predicts that within ten years the demand for physicists will be far greater than it is to-day. Two important research posts during the last few years, carrying salaries of £3,000 a year, would, to his knowledge, have been filled by physicists if there had been any available with the requisite knowledge and experience. His advice to young men interested in applied physics—and it is based on knowledge and insight—is to get into industry now that the tide is changing, and he believes that in a few years' time they will find themselves carried forward at a rapid rate. The staffs of electrical research laboratories tend to increase rather than to diminish. The growing demand for physicists in the chemical industry proceeds, he asserts, sometimes at the expense of chemists. In the textile industries, in the steel and metal industries, in the Government research laboratories, there is increasing room for physicists, and the higher positions will be filled by them.

As to salaries, Mr. Tizard puts the relative attractions of State posts and industrial posts in this way: the chance of securing salaries of £2,000 a year and upwards is greater, and the chance of securing £1,000 to £2,000 a year is less, in industry than in Government research laboratories. At present the initial salary at Government establishments for men who have taken a higher degree at a university and who have had some research experience, is about £250 a year, and rises by annual increments. There are many higher posts carrying salaries of £1,000 a year; the salaries of directors of research vary from £1,500 to £2,000 a year approximately. The tendency is for the number and salaries of the higher posts to increase. In industry the initial salary for men of similar qualifications is often higher, £300 or more, and the chief posts are better paid, but the security of tenure is not so great, nor is the prospect of reaching salaries of £1,000 a year so assured.

Mr. Tizard finally has a word of encouragement for the average man. The type of work on which the greater number of physicists will be employed does not, in his view, require exceptional originality. But it does require a broad grasp of the principles of physical science, experimental skill, and a desire to achieve practical results. All these qualities, in his opinion, can be acquired by the average man who has a university education, and however much industry, as

well as science, may owe to exceptionally gifted men, "no big advance in industry is possible without the help and enthusiasm of the average man."

Rationalising the Chemists Themselves

It was Dr. W. R. Ormandy who, during a recent discussion on "Rationalisation," unfeelingly reminded the meeting that the organisation of chemists themselves and of their different societies was about as irrational as anything could be. Mr. F. Scholefield, at the Manchester meeting of the B.A.C., emphasised the need of a more logical reorganisation of societies, as numbers of other chemical leaders had already done from time to time. And now a writer in the *Manchester Guardian Commercial* has been collecting instances of unreason in the matter of organisation that the chemical societies present, and sketching the ideal of a final unity in which chemists will have one faith, one hope, one tabernacle, one president, one secretary, one editor, one subscription fee, and everything else for the future in the singular degree. There can be no doubt that much obvious gain would result. At the same time, it would be at the cost of the always attractive quality of variety. It must be remembered, too, that societies, like village chapels, will fight very spiritedly for their own existence, and that keeps them in a lively state of animation, whereas, welded together into one immense entity, a terrible inertia might infect the mass, requiring great vitality to resist it. Still the large idea works well in America, and there is certainly room for some of it here.

What Dr. Ormandy, we fancy, had mainly in mind, was the wastage in the matter of technical contributions to the various societies. The subjects of papers, for example, seem to be selected on purely individualist lines; excellent as they are considered singly, they have no collective objective; many of them are presented before small assemblies they may not wholly interest, and often miss the larger community that would eagerly welcome them; the authors are rather like the wind that bloweth where it listeth. This is one field in which a little sensible co-ordination of effort would be desirable.

But we had no idea there were so many others until we studied the catalogue that a correspondent has studiously compiled. There is, for example, the publication question. First, we are told, a medium for the publication of scientific work in chemistry is needed. Secondly, there is wanted one journal to record all the proceedings of the various professional societies. "An official journal, published monthly or quarterly, could well record the proceedings of the Chemical Society, the Society of Chemical Industry, the Institute of Chemistry, and the British Association of Chemists much more efficiently and at a fraction of the cost of the present publications of these societies." It was prudent of the author of this claim not to disclose his identity; such things, in the present state of feeling, are unsafe to say. Thirdly, we want an even more comprehensive Bureau of Abstracts, and many other reforms. A large and noble programme thus unfolds itself. It may come about in time, and meanwhile it will continue to supply material for entertaining discussions.

The "C.A." Annual Review Number

On December 28 we shall publish, for the eleventh year, the Annual Review Number of The Chemical Age. The contents promise to be as important and comprehensive as on any previous occasion. Brig.-Gen. Sir Wm. Alexander, M.P., will, as for several years past, contribute a general review of British chemical industry in 1929, and this will be supplemented by a more detailed account of developments in various branches by Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers. Sir D. Milne-Watson, Governor of the Gas Light and Coke Co., will write on "Recent Progress in the Gas Industry." The scientific developments in the nitrogen industry will be dealt with by Dr. E. B. Maxted, while another authority will deal specially with the British synthetic fertiliser industry. The dyestuffs industry, from the scientific side, will be covered by Mr. L. J. Hooley (of Scottish Dyes, Ltd.), and from the consumer's side by an inside authority. Mr. J. Arthur Reavell is writing on developments in the British chemical plant field. The heavy chemical industry will be reviewed by Mr. P. Parrish. In addition to detailed reviews of the work of the principal chemical societies, there will be important contributions on the chemical inventions of the year, on the progress of research under the Department of Scientific and Industrial Research, and on the year's progress in the solvents industry. As this Annual Review Number is filed for reference, by home and overseas readers, as the most complete and authoritative review of British chemical industry published, there is usually an exceptional demand for it, and orders for any extra copies should be sent in early, as the issue is usually soon out of print.

Books Received

Law and Industry. By G. S. W. Marlow. London: Baillière, Tindall and Cox. Pp. 320. 18s.

Cantor Lectures on The Treatment of Coal. By C. H. Lander. London: Royal Society of Arts. Pp. 50. 2s. 6d.

The Effects of Moisture on Chemical and Physical Changes. By J. W. Smith. London: Longmans, Green and Co. Pp. 236. 15s.

Transactions of the Institution of Chemical Engineers. Vol. 6. London: Institution of Chemical Engineers. Pp. 202.

Technical Chemists' Handbook. By George Lunge. London: Gurney and Jackson. Pp. 262. 12s. 6d.

The Calendar

Dec.		
14	North of England Institute of Mining and Mechanical Engineers. 2.30 p.m.	Newcastle-on-Tyne.
16	Chemical Industry Club: "Holiday Experiences on Land and Water." Dr. W. R. Ormandy. 8 p.m.	2, Whitehall Court, London.
16	Society of Chemical Industry (Yorkshire Section): "Asbestosis and Silicosis." Professor M. J. Stewart.	Leeds.
17	Society of Chemical Industry (Yorkshire Section): "Asbestosis and Silicosis." 7.15 p.m.	Medical School, Leeds.
17	Royal Photographic Society. 7 p.m.	35, Russell Square, London.
18	Society of Glass Technology. 2 p.m.	Science Museum, London.
19	Institution of the Rubber Industry (Manchester Section): "Reclaimed Rubber." (Number of papers).	Manchester Café, Ltd., Exchange Buildings, Manchester.
19	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London

Vapour Absorption and Adsorption

Conference Held by the Institution of Chemical Engineers

On Thursday and Friday, December 5 and 6, the Institution of Chemical Engineers held a conference on "Vapour Absorption and Adsorption," in the rooms of the Chemical Society, Burlington House, London. Eight papers were read and discussed.

THE first paper was read on Thursday morning, December 5, by Professor J. C. Philip, who dealt with "The Reversibility of the Adsorption Process and the Thickness of the Adsorption Layer." He pointed out that for numerous systems the sorption and desorption curves did not coincide. Experimental evidence seemed to establish beyond a doubt that this "hysteresis" effect was a genuine one. Various theories of adsorption postulated either that the adsorbed layer was unimolecular in thickness, or on the other hand, that it was multimolecular. The evidence was conflicting. Attempts had been made to determine the area of surface of porous adsorbents, but a trustworthy method was not yet available.

Recovery of Acetone Vapours from Air

Dr. W. R. Ormandy, in a paper on "The Recovery of Acetone Vapours from the Air," said that sulphuric acid and phosphoric acid at high concentrations had been found to be almost perfect absorption media for acetone, whilst in a diluted state they were little, if any, better than water. Phosphoric acid has been shown to be an excellent medium for acetone, and was in many respects superior to sulphuric acid. Unfortunately, there seemed to be no material from which a large scale apparatus could be constructed, capable of withstanding the action of hot strong phosphoric acid. For practical purposes, therefore, the use of phosphoric acid must be ruled out at present.

With sulphuric acid, experiment had shown that mixtures of acetone with acid of high concentration were quite stable if the temperature did not exceed about 15° C. and the acetone content about 20 per cent. by weight. In practice, to avoid the chance of decomposition and also to avoid the difficulty of reconcentrating acid to high strengths, it was preferred to limit the initial strengths of the acid to 77 per cent. (S.G. = 1·70) and to operate in such a manner that at the completion of the absorption, the acid strength (calculated on the acid-water ratio only) did not fall below 73 per cent. (S.G. = 1·65).

Absorption in Sulphuric Acid

In practice, the air containing the acetone vapour was led counter-current fashion against a stream of acid in a tower or other scrubbing device. During the absorption the acid should be kept below 25° C. or as much lower as was practicable. The mixture of two volumes 1·64 S.G. acid and one volume acetone from the scrubber should be diluted with one volume of water, so that after the removal of acetone the acid would have a strength of 55 per cent. (S.G. = 1·45). The acetone could be distilled off in the anhydrous state by the use of a fractionating column. Alternatively the acetone could be distilled off without fractionation by means of live steam. After the removal of acetone the acid at 55 per cent. strength, or possibly less if live steam were used, had to be concentrated to 79 per cent., when, after cooling, it was ready to be returned to the cycle.

On Thursday afternoon, the papers read were:—"The Recovery of Benzole from Coal Gas, with Particular Reference to the Use of Active Charcoal," by H. Hollings, S. Pexton and R. Chaplin, and "The Absorption of Nitrous Gases," by H. W. Webb.

The Brégeat Recovery Process

"The Recovery of Volatile Solvents (Brégeat Process)" was the subject of a communication from Mr. A. Hock, on Friday morning, December 6. Mr. Hock pointed out that the solvents used in industry could be divided into those miscible with water and those immiscible with it. In the Brégeat process, cresol was used as the absorbent for the former, and tetraline (tetrahydronaphthalene) for the latter.

The installation designed for the application of cresol to the recovery of water-miscible volatile solvents includes an absorbing plant and a distilling and rectifying plant. In the absorbing plant, the scrubbing or washing of the gaseous mixtures containing the solvent vapours takes place in vertical steel plated scrubbers, filled with special Brégeat fillings (spires) where the cresol and the mixture of air and vapours circulate in opposite directions. The separation of the solvent vapours from the cresol is effected in a special apparatus, and the plant includes all necessary columns, preheater, heat exchanger, dephlegmator, etc., required to obtain on the one hand the solvents at their highest degree of purity and concentration, ready to be used again in the manufacture, and on the other hand the cresol, free from solvents, which is then sent into coolers, to be applied to a fresh absorption. It is thought that in many instances the absorptive power of cresol depends on its capacity for forming oxonium compounds.

Active Carbon

On Friday afternoon, Messrs. K. Evans, H. F. Pearson and E. Reisemann read a paper on "The Industrial Applications of Active Carbon." The definition given of active carbon was "a material consisting principally of carbon, which had its power of absorbing, or more correctly adsorbing, gases and vapours, etc., increased many fold by special processes." The applications of active carbon to industry were very numerous, and affected practically all industries using organic solvents, *e.g.*, rubber, celluloid, artificial silk, oil extraction, dry cleaning, glue, smokeless powder, etc. It was also applicable to the recovery of benzol, etc., from illuminating gas, the recovery of natural gas, and in the petroleum industry.

Manufacture of Active Carbon

Various processes for the manufacture of active carbon were described in the paper. The Carbo-Union processes of manufacture included the Bayer process of the I.G. Farbenindustrie A.G., of Leverkusen, and the Urbain process of the Compagnie des Produits Chimiques et Charbons Actifs Ed. Urbain, of Paris.

In the Bayer process, the raw material, peat, sawdust or any other carbonaceous material, was ground and mixed into a paste with a metallic chloride, such as zinc chloride, the resulting paste being extruded through die-presses to form string-like rods of suitable diameter. These rods, after having been broken into short lengths, were calcined in a rotary furnace, washed, sieved, graded and finally packed in drums ready for use.

The Urbain process was similar to that employed at Leverkusen except that a solution of phosphoric acid was used instead of zinc chloride. The paste was dried at about 500—600° C., and subjected to a temperature of about 1,200°C.

In some processes, steam and gas were also employed for the activation of carbon.

Solvent Recovery Plants

A solvent recovery plant employing active carbon, said the authors, had two or more adsorbers containing active carbon, one of which was adsorbing the vapour or was "under gas" while the other was having its adsorbed vapour removed or was "under regeneration." It was possible in very small plants to operate with only one adsorber.

The Carbo-Union active carbon plants were divided into two broad classes, one type having heating coils within the adsorber, and the other type being without such heating coils. The heating coils allowed of quicker regeneration, but whether breaking coils were used or not depended on the economics of each particular case. The form of the adsorber might be either vertical or horizontal, these terms referring to the axes of the cylindrical shells of the adsorbers. In both cases, however, the passage of the vapour-laden air or gas was from the bottom upwards. The type without heating coils was used for such solvents which, on regeneration of the carbon, suffered a slight decomposition and had a corrosive action due to the resulting acid products. The principal parts of a recovery plant were the adsorbers, the condensers, a water separator (non-water soluble solvents), a storage tank and a blower for drying and cooling air.

Other papers read on Friday, December 6, were "The Evaporation of Water in Open Pans," by G. W. Himus, and "The Fractional Adsorption of Gases," by J. S. Morgan.

Progress of the Dyestuffs Patent Action

Case for Respondents Concluded: Petitioners' Case Opened

SINCE the last issue of THE CHEMICAL AGE, the hearing of the dyestuffs patent action between Imperial Chemical Industries and the I.G. Farbenindustrie A.-G. has been continued.

On Thursday afternoon, December 5, Mr. Trevor Watson commenced the re-examination of Dr. Oberlander. Counsel observed that there were, of course, an immense number of anilides, and those varied as to their properties. Dr. Oberlander agreed.

Mr. Watson: If you have an anilide, or, for the matter of that a diazo compound, and it is difficult to couple, there are expedients of neutralising it, commonly known to chemists?

Dr. Oberlander: Yes. It is a well-known practice.

If your diazo coupling gave difficulty that would be one of the methods you would employ?—Yes.

Would it have been a practical thing to set out in a classification of this character, detailed directions as to the procedure to be adopted with each?—Dr. Oberlander replied that a paper on the subject was read by Beck in 1914 and any chemist would know particulars or procedure.

Fastness to Kier Boiling

Replying to other questions, Dr. Oberlander said nobody ever suspected that the dyes under the patents of 1912 and 1913 would be fast to kier boiling. The bad results given after kier boiling denoted that the couplings were wrong at that time. The 1922 patents dealt with diazo compounds. He thought the specification of patent No. 193,834, purporting to describe and claiming a process for the manufacture of azo dyestuffs, which consisted in coupling a diazo compound with an orthoalkyloxy anilide of 2 : 3-oxynaphthoic acid, a perfectly good proposition.

Mr. Watson: Since 1922 there has been great activity to provide a dyestuff fast to kier boiling?—The 1922 dyestuffs were pioneer dyestuffs, and research is still going on to get a dyestuff fast to kier boiling. Between the years 1912 and 1922 nobody suggested it, but since the suggestion has been made there has been a great deal of research.

Have you, as a chemist, any difficulty in understanding from the specifications of the registered patents what it is that the inventor alleges to be novel about his arrangements?—There is no difficulty at all.

Replying to other questions, Dr. Oberlander said he understood that the objection in this respect simply meant that some couplings would never give a fast dye at all. The patents disclosed a satisfactory knowledge.

On Friday, December 6, Dr. Oberlander gave further evidence with the object of showing that the respondent's patents covered an important inventive step in the production of azo dyestuffs, and one which had not been disclosed in any prior documents or specifications, as the petitioners alleged.

This concluded Dr. Oberlander's evidence, he having been in the witness-box for nine days.

The Dyer's View

Mr. Joseph Lawson, managing director of R. P. Lawson and Sons, Ltd., yarn dyers, of Rodney Street Works, Manchester, spoke of his experience of the advantage of azo dyestuffs coupling in the yarn over dyeing with Turkey Red. Azo dyestuffs were more rapid, and made it possible to dye goods in continuous machines, a thing that could not be done with Turkey Red. Before 1922, the date of the German patents, he had never heard of any azo dyestuffs which were fast to kier boiling.

Dr. J. N. Goldsmith, consulting chemist, was the next witness. He said he had industrial experience of dyeing and bleaching operations. In his consulting practice, he had been consulted on dyes. He had visited leading dye works in Germany and England, and witnessed the manufacture of dyes. Witness first saw kier boiling in 1893, at a factory at Manchester.

His lordship: Do you mean kier boiling under pressure?

Witness: Yes. I hesitate to say if it was caustic soda boiling. Witness said he had made a number of tests with different samples of cotton.

Witness produced cards showing the results of his tests.

On Monday, Dr. Goldsmith gave evidence in support of the respondents' case and generally corroborated the evidence given by Dr. Oberlander. He thought the results showed a great range of fastness of respondents' dyestuffs. In witness's opinion lack of fastness to kier boiling indicated incomplete coupling.

On Tuesday, Dr. Goldsmith, replying to questions by Mr. Trevor Watson, gave the results of kier boiling on certain cards of hanks that had been tested as to certain dyestuffs. He said that as regards hanks on the cards of unselected dyestuffs, the dyes had been destroyed by kier boiling. With regard to the selected dyestuffs, three cards had resisted kier boiling—in other words, had passed kier boiling. So far from being destroyed, they were scarcely affected. Of the selected dyestuffs, they took the dyes from 6,379 GL (example three out of patent A), a well-known dye, and known as a substitute for Turkey Red under the C patent.

His lordship pointed out that the complexity might be considerable unless they knew what they were dealing with, seeing that another tribunal might have to deal with the matter. There would probably be 30 volumes of shorthand notes, and this point should be made clear if the Court had to deal with the matter. This was merely an experiment made in relation to something which had already been the subject of other tests.

Mr. Whitehead, intervening, said that in opening the case he introduced certain samples showing the disastrous effects which resulted from kier boiling, and he put an example showing what could resist kier boiling. He refrained from using them for any other purpose.

His lordship: I understand that. I thought that Mr. Trevor Watson was attributing some importance to it.

This concluded the examination-in-chief of Dr. Goldsmith.

His lordship: How is it that diazo compounds have names by themselves which indicate the dyes? For instance, Fast Red R.

Dr. Goldsmith: It is named by traders. Diazo compound alone is not a name.

Mr. Cripps cross-examined. He asked if witness's suggestion was that the petitioner's dyes were to any extent faulty dyes.

Dr. Goldsmith said he did not know. He suggested that the bleeding in the sample hanks was due to the dyes. Witness accepted his own tests.

Mr. Cripps: We adopted the same tests as you did.

Replying to further questions, witness said he had carried out research on dyestuffs and had made an invention, and he felt he could give a fair judgment on dyestuffs.

Evidence of Mr. S. R. Trotman

On Wednesday and Thursday, Mr. Samuel Russell Trotman (Public Analyst for the City of Nottingham and the boroughs of Grantham and Newark-on-Trent, and Sir Jesse Boot lecturer in Applied Chemistry in University College, Nottingham), was called as a witness for the respondents.

He said that he had had considerable experience as a consultant to the bleaching and finishing industries, had been in consulting practice for nearly forty years. He had seen the operation of kier boiling carried out in numerous bleaching factories.

Mr. Whitehead: Have you found that the same kier liquor is always used, or different kier liquors?—In the operation of kier boiling a solution of caustic soda in water is used, or a mixture of lime and water.

When those liquors are used, what has been the nature of the goods which have been subjected to kier boiling; that is to say, either caustic soda or a mixture of lime and water?—The mixture of lime and water is used for heavy goods only, such as are bleached in the North of England principally. The caustic soda solution is used for all kinds of goods, but principally, or exclusively, in the treatment of light goods, such as are bleached in the neighbourhood of Nottingham.

When caustic soda or a mixture of lime and water has been used as kier boiling liquid, have the goods which have been boiled been all white goods, or have they had a coloured stripe in them?—The goods with which I am principally acquainted have not got coloured stripes, but are all grey goods.

In your experience, what has been the liquor used for boiling

goods with a coloured stripe ?—It is a modified kier liquor which as a rule consists of sodium carbonate instead of caustic soda or lime.

If sodium carbonate is used, is that usually called kier boiling or scouring ?—In the strict sense of the term, I understand by kier boiling, the boiling with caustic alkali only under atmospheric pressure or at a raised pressure. When sodium carbonate or a milder alkali is used, although it is loosely called kier boiling, sometimes it is really scouring.

On general principles, is there any advantage in using caustic soda as compared with sodium carbonate if the goods permit you to use caustic soda ?—Yes. The advantage is that one cannot get a good or a durable white unless the cotton waxes are removed completely. It is not easy to remove the cotton waxes even with caustic soda, but with sodium carbonate it is very different indeed, and hence the subsequent bleaching is much more difficult. The bleacher would always use caustic soda if the dyestuffs permitted it.

If you had been told in 1922 that an invention had described how to obtain dyestuff which would resist caustic soda boiling in a kier, would you have regarded that as a useful contribution to the art, or not ?—I should regard it as a very considerable advance in the bleaching of coloured goods.

Prior to 1922, had you ever heard of an azo-dyestuff which was fast to kier boiling ?—No. The azo dyestuffs when dyed on cotton were notoriously not fast as a class to kier boiling.

His Lordship : Is there a recognised method in this trade of judging the fastness to kier boiling ?—No, my lord, at present there is no recognised method ; the whole subject is under the consideration of a Joint Committee to try to set up universal standards. It is visual at the present time. All you can do is to compare the treated specimen with the original specimen.

This concluded the evidence for the respondents.

The Hon. Stafford Cripps, opening the case for the petitioners Imperial Chemical Industries, Ltd., said he had three points to deal with ; whether the patents as granted were valid, whether the amendments should be allowed, and whether the amendments would make the patents valid. He contended that there was no invention here, as all the respondents had done was, in the course of manufacture, to discover certain qualities in the dyes. There was no new process in regard to known qualities, and therefore there could be no patent.

The hearing was proceeding.

Chemicals from Petroleum and Petroleum Gases

A Growing Modern Industry

At a meeting of the Society of Chemical Industry, Birmingham and Midland Section, at the Chamber of Commerce Buildings, Birmingham, on Thursday, December 5, Dr. W. H. Brownsdon presiding, a paper on " Petroleum and Petroleum Gases as Chemical Raw Materials " was given by Mr. H. M. Stanley.

Mr. Stanley said that the lack of chemical development in the utilisation of petroleum hydrocarbons was to be ascribed primarily to the difficulty of isolating pure hydrocarbons from the complex mixtures produced by nature, and also to the lack of definite knowledge of the chemistry of even the simpler paraffin hydrocarbons. The quantities of material available for chemical synthesis were extremely large, while enormous quantities of natural gas, consisting of the lower paraffin hydrocarbons from methane upwards, were being wasted, notably in Canada and Persia, because the producing wells were too remote from points of possible industrial and domestic utilisation.

Production of Pure Hydrocarbons

The difficulty of isolating pure hydrocarbons from natural gas and from the lower fractions of petroleum had been largely overcome, and large quantities of pure methane, ethane, propane, butane, and pentanes are available in the United States and elsewhere. As the molecular complexity of these hydrocarbons increased, the number of isomers, and consequently the difficulty of separating pure individual hydrocarbons, became increasingly large. As regards the higher fractions of petroleum, so little was known of the chemical properties of the individual constituents that there was little possibility of utilising these substances for the production of pure chemicals.

It was noteworthy, however, that certain crude petroleums, notably those from Borneo and Burmah, contained considerable proportions of aromatic hydrocarbons. These consisted, besides benzene and toluene, of considerable proportions of benzene derivatives with iso- and tertiary alkylated substituents. This type of benzene derivate with branched side chain substituents was becoming of great importance in the manufacture of synthetic organic chemicals. Accordingly, such aromatic-containing petroleums might be of great value as sources of certain important benzene derivatives.

Methods Employed

Of the general methods employed for the conversion of the gaseous and low-boiling constituents of natural gas and petroleum into useful chemical materials, the most important were chlorination, oxidation and pyrolysis. Thus Boswell and McLaughlin had recently shown that methane could be converted into methyl chloride with good yields, while the lochrination of a mixture of pentane and isopentane to amyl chlorides, with subsequent hydrolysis of the latter to a mixture of amyl alcohols, was being carried out on a very large scale by the Sharples Solvents Corporation in America. The oxidation of the paraffin hydrocarbons was likely to become of very great importance, and it was reported that large quantities of methyl aclohol and formaldehyde were being produced in this way in the United States. Moreover, it was possible to convert paraffin hydrocarbons into olefines, which were much more amenable to chemical transformation, by a process of controlled oxidation.

Pyrogenetic Decomposition

The pyrolysis of the gaseous paraffin hydrocarbons could be controlled in such a way as to yield either an olefine of the same or lower number of carbon atoms, or a mixture of aromatic hydrocarbons, or carbon, hydrogen and methane. The pyrogenetic dehydrogenation of the paraffin gases was being commercially accomplished in the United States for the production of ethylene and propylene, which were used in chemical synthesis. A recent British patent (B.P. 315,193) described the conversion of propane into ethylene and methane by passage of the gas over a catalyst of calcium carbide or molybdenum on pumice at 600°–800° C. Methane itself could be converted into aromatic hydrocarbons, though the yields were better in the case of the homologues of methane ; ethylene and acetylene were simultaneously produced, and it had been shown recently that if methane was subjected to a very high temperature (2,000° C. and over) for a very short time, very high yields of acetylene could be produced. The processes for converting methane into acetylene by subjecting the former gas to the action of electric discharges were undoubtedly very promising, and were the object of intensive research at the present time.

Cracking

The so-called " cracking " processes, which were so valuable for converting the higher fractions of petroleum into motor spirit by a process of thermal degradation, gave rise to large quantities of permanent gas, containing from 10 to 60 per cent. of olefines, including ethylene, propylene and the butylenes. This " cracking " gas (together with the cracked spirit, which also contained quantities of the higher olefines such as amylenes and hexylenes) was a very important raw material for the manufacture of secondary and tertiary alcohols such as isopropyl, secondary butyl, and secondary amyl alcohols. The ethylene produced by the cracking of ethane was used by the Carbide and Carbon Chemicals Corporation in the United States for the production of ethylene dichloride, ethylene glycol, diethylene glycol, triethanolamine and many other valuable substances.

The question of the possible utilisation of petroleum hydrocarbons as raw materials for the production of diolefines, capable of being used for the manufacture of synthetic rubber, was engaging much attention.

Cullet in Glassmaking

Discussion at Society of Glass Technology

At the meeting of the Society of Glass Technology held in the University, Leeds, on Wednesday, November 20, a general discussion took place on "The Function of Cullet in Glassmaking."

The discussion was introduced by two papers, namely: "The Effect of Repeated Re-melting of Glass in Sillimanite and in Fireclay Pots," by A. A. Childs, Violet Dimbleby, H. W. Howes and Professor W. E. S. Turner; "The Effect on some Physical Properties of Glass repeatedly melted in Platinum," by Violet Dimbleby, H. W. Howes, F. Winks and Professor W. E. S. Turner.

Professor Turner dealt with the two papers together, as the work described in the second was the outcome of difficulties met with in the first investigation. In previous papers were described the effects of varying the proportions of batch and cullet in soda-lime-silica and in potash-lead oxide-silica glasses. The present investigations were undertaken in order to test the effect of repeated remeltings on the composition and working properties of the same glass originally made from batch. The first series of tests were conducted using a simple lime-soda-silica glass, made and remelted many times in a sillimanite pot. The glass made from batch was worked from the pot, broken up, returned to the pot, remelted, worked out again, and samples taken. The bulk was broken up, returned to the pot, remelted, worked out, and further samples taken. This procedure was repeated until samples had been obtained each representing a definite number of remeltings of the same glass.

Corrosion of the Pot

The amount of corrosion observed on the pot after the remeltings of cullet was astonishing, and was confirmed by the irregular, yet considerable, percentage of ferric oxide and alumina found in the glasses on chemical analysis. A second series of glasses gave similar results. The compositions of the glasses were given in full, and revealed a diminution in soda as the remeltings progressed, but it was not obvious, from simple inspection, whether this diminution in the alkali was due to actual loss or to change in the proportions of the constituents due to the absorption of material from the pot.

The glass worker reported a shortening of the working range, and an increase in brittleness of the glasses with each remelting. The glasses also became darker in colour.

The absorption of a considerable quantity of pot material by the glasses vitiated all attempts to determine the effect of remelting alone on the physical properties of the glasses. A further series of remeltings using a harder glass was carried out in exactly the same manner in a fireclay pot, but this time the pot attack was greater than in the sillimanite pots, although the glass used was of lower soda content than in the earlier series. A series of annular depressions were formed in the pot walls corresponding to the level of the metal in the successive meltings. It was useless to employ these glasses for tests on working or physical properties

Use of Platinum Vessels

A further investigation was, therefore, undertaken, glasses being made and remelted repeatedly in platinum, to eliminate, as far as possible, the corrosion of the vessel. Of necessity, the amount of glass made was small. A very small amount of platinum was dissolved into the glass, but this was very minute, and, for the purposes of this investigation, negligible. Two series of glasses were made as in the sillimanite pots, and it was found that three repeated meltings were necessary before these small melts were homogeneous. Accordingly a third set of remeltings was completed, the glass being crushed and remelted twice before any samples were taken for test. Seven samples were obtained, each representing a further remelting.

The chemical compositions, densities, annealing temperatures and thermal expansions of the glasses were determined. It was found that the chemical compositions varied but slightly throughout the whole number of samples. There was a slight tendency to diminution of soda as the remelting proceeded, but the differences found were not appreciably greater than analytical error. Very little variation was found in the annealing temperatures, densities, or thermal expansions of the glasses.

In conclusion, Professor Turner stated that so far as those properties examined were concerned, the remelting of a homogeneous glass did not effect any appreciable change. The cullet problem seemed to be a problem of diffusion, and if cullet were properly crushed and mixed intimately with the batch, then it should be possible even to employ "foreign" cullet, within reasonable limits, successfully.

Technical and Works Controls

The Importance of Personality

A joint meeting of the Manchester Sections of the Society of Chemical Industry and the Institution of the Rubber Industry was held in the Engineers' Club on December 6 (Dr. R. H. Pickard in the chair), when a paper on "The common factors of technical and works controls in the rubber industries" was read by Mr. H. C. Young.

The paper dealt mainly with the psychological aspect of works administration, and for this purpose Mr. Young stated that he could observe no difference between the controls of a chemical works and those of a rubber factory; the same principles applied. Technical control was often regarded as the brains of the factory. This was only partly correct; it certainly was the brains of the factory, but not all the brains. Other brains were centred in the production control. The technical control was the designing control, and, possibly, the inspiring control; the works control stimulated speed of production and maintained the standard quality of production. In all controls the main factor was personality, and no type of control could achieve success unless it treated the right type of men. With the wrong type of men there would be a "touch" where there should be a "grip" or a "grip" where there should be a "touch."

Technical control aimed at four main things: Control of the raw products, control of the material during process, control of the actual process, control of the materials when in use and of the issuing of the finished materials. Works control governed the handling of the material as required, the keeping of the plant to the process speed and temperature, and control of the labour within the limits and requirements of the technical force.

The Technical Aspect

It was sometimes forgotten that the raw product of one factory was the finished product of another, and as long as the raw product supplied was according to specification it was accepted as satisfactory. This was not sufficient. For instance, in the case of carbon black it might be found that there was a variation in quality week by week, and therefore it paid to examine it for particle size, tailings, or moisture. He was treading on somewhat thin ground when he stated that the present day chemist frequently assumed that certain materials were constant in quality, but there were variables in all materials differing according to the locality from which they were obtained, climate, and other considerations. The man exercising technical control should be possessed of a healthy suspicion about everything and a legitimate curiosity as to the materials with which he dealt. It might seem almost ludicrous to mention the advisability of final testing of products, yet in many industries no such final tests were made.

Man Power

As a rule everybody in a factory seemed to think he was quite capable of "bossing" the human element in it, from the poor floor sweeper upwards, but very little regard was paid to a number of other very important units busily threatening economic production, such as the wearing out of engine bearings and the unnecessary heating of water. In an ordinary chemical factory the friction load was in the order of 25 per cent. and in a rubber factory 30 per cent. The production man had to control his horse power wastage; he should know how much horse power he was allowing per piece or per quantity of production. The same remark applied to man power. The ratio between horse power and man power, approximately, was in the order of 5·6 horse power per man in the steel industry, 4·8 in the cotton industry, 2·8 in the chemical industry, 1·8 to 2·0 in the rubber industry, in the most modern type of motor car works 0·45, and in the boot factory 0·44. There should be a maximum of output with the minimum of man power effort.

Society of Public Analysts

Methods of Examining Old Pictures

AN ordinary meeting of the Society was held at the Chemical Society's Rooms, Burlington House, London, on Wednesday, December 4, the President (Mr. Edward Hinks) in the chair.

Certificates were read for the first time in favour of R. G. Baskett, B.Sc.; H. C. L. Bloxam, F.I.C.; C. McClellan Bottomley, B.Sc.; J. Butler, B.Sc., F.I.C.; R. Ellison, A.M.C.T.; G. N. Grinling, F.I.C.; A. Houlbrooke, M.Sc., A.I.C.; P. H. Jones, F.I.C.; R. Mallinder; S. N. H. Stothart, B.Sc., Ph.D., A.I.C; and H. Threadgold, B.Sc., A.I.C.

Certificates were read for the second time in favour of N. L. Allport, A.I.C.; J. G. Lunt, B.Sc., A.I.C.; F. Morris, F.I.C.; A. W. Peters; J. H. Quastel, D.Sc., Ph.D., A.R.C.S., A.I.C.; and J. H. Totton, B.A., B.Sc., F.I.C.

The following were elected members:—A. G. Avent, A.I.C.; W. Rhys Davies, F.I.C.; E. R. Dovey, A.R.C.Sc., F.I.C.; J. Gray, F.I.C.; J. Henderson, B.Sc., A.I.C.; C. A. Scarlett, B.Sc., A.K.C., A.I.C.; P. A. W. Self, B.Sc., F.I.C.; T. B. Smith, B.Sc., A.R.C.S.

Pigments of Old MSS. and Paintings

Professor A. P. Laurie, in a lecture on "The Methods of Examining Pictures," gave an outline of the composition of the different pigments used for old illuminated MSS. and oil paintings, and it was shown how the identification of these enabled the approximate date of an ancient work of art to be ascertained. The methods of sampling the pigments on a painting by means of a micro-borer and their examination by means of a microscope ploariscope were described, and a summary of the micro-chemical tests which had been found most suitable for the various classes of pigments was given. The conclusions to be drawn from chemical and optical data were illustrated by lantern slides of photographs in colour of historic paintings and illuminated missals. The use of X-ray photography and ultra-violet rays for the examination of pictures and the detection of alterations or forgeries was discussed and illustrated, and it was shown how an examination of the brush strokes in an oil painting, considered in conjunction with the chemical and optical properties of the pigments, enabled a judgment to be formed as to whether the whole work had been produced in one studio and at the same period.

In a paper on "The quantitative analysis of mixtures of nickel and cobalt," by S. Glasstone, D.Sc., and J. C. Speakman, it was pointed out that electrometric titrations of nickel and cobalt solutions with potassium cyanide, with the use of nickel and cobalt indicator-electrodes, respectively, had established the soundness of the theoretical basis of the Rupp and Pfennig method of determining these metals. It was applicable to mixtures and to more dilute solutions than had previously been used. A modified iodimetric method had also been developed for determining small amounts of cobalt in the presence of nickel.

"The changes with age of the hydrogen ion concentration of egg white and egg yolk" was the title of a contribution by J. C. Baird, B.Sc., A.I.C., and J. H. Prentice, B.Sc., A.I.C.

United States Carbon Black Export Association

COMPANIES producing more than 92 per cent. of the world output of carbon black have formed the Carbon Black Export Association, Inc., a Delaware corporation. According to the United States Bureau of Mines, exports of carbon black were about 78,000,000 lb. in 1928, valued at nearly $7,000,000. Exports for 1929 are estimated to exceed 100,000,000 pounds. Participating in the formation of the Export Association are the Binney and Smith Co., representing the Columbian Carbon Co., the Coltexo Corporation, the Keystone Carbon Co. and the Texas Louisiana Carbon Black Co.; the United Carbon Co., including its subsidiaries, the Kosmos Carbon Co., the Eastern Carbon Black Co. and the Crystal Carbon Co.; Godfrey L. Cabot, Inc., including the Texas Elf Carbon Co., the Cabot Co., the Cabot Carbon Co. and Gas Products Co.; J. M. Hubor, Inc., including the J. M. Hubor Co. of Louisiana, Inc., the Ebony Carbon Co., the Western Carbon Co. and the J. M. Hubor Pigment Co.; the Palmer Gas Products Corporation, representing the Associated Carbon Black interests of the Palmer Corporation and the Electric Bond and Share Co.; and R. W. Groeff and Co., Inc., representing the Texas Carbon Industries, Inc.

Professor Perkin's Will

Research Studentships Founded at Magdalen College

THE late Dr. William Henry Perkin, F.R.S., Waynflete Professor of Chemistry in the University of Oxford, who died on September 17, aged 69, left estate of the gross value of £43,687, with net personalty £43,365. He left £200 and the balance of his household and personal effects to his wife, Mrs. Mina Perkin, and all other property upon trust for her benefit for life. On the death of his wife he left:—

£5,000 to the Royal Society for a "Perkin Fund," of which the income is to be applied for the general purposes of that society; and £1,000 to the Chemical Society, Burlington House, W., for the Publications Fund of that society.

After other bequests, and also on the death of his wife, he left all other his property to the President and scholars of the College of St. Mary Magdalen, in the University of Oxford, for a "Perkin Research Studentship Fund," for the endowment of one or more studentships to be awarded to post-graduate male students of universities within the British Empire: (1) To enable such students as are not members of the University of Oxford to proceed to and be matriculated at the University of Oxford and to engage in research work in the University chemical laboratories; (2) to enable such students as are already members of the University of Oxford to proceed to other universities within the British Empire and to engage in research work in the chemical laboratories of such universities.

The Perkin Research Studentships

These studentships are to be of the value of £350 per annum each (to which may be added a grant for the purposes of research not exceeding a further £50 per annum), and are to be given in any branch of chemistry, but, *ceteris paribus*, preference is to be given to research work in organic chemistry. The studentships are to be awarded by an advisory committee consisting of the President for the time being of Magdalen, the Estates Bursar of Magdalen, the Waynflete and the Dr. Lees Professors of Chemistry in the University of Oxford, the Professor of Physical Chemistry in the University of Oxford, and a University demonstrator in each of the chemical laboratories of the University for the time being. Candidates are to be graduates (with distinction in chemistry) in a university within the British Empire (preference being given to a candidate who has not left his university), and each must satisfy the advisory committee that he is of high character and competent health, has had a good general education, has already given high promise of capacity for advancing chemical science by original research, and that he has not otherwise the means to engage in such research. Elected candidates are to devote their whole time to research, except for one term in each year, when they may act as demonstrators in the chemical laboratory in which they work, and during one (whether the same or another) term in each year give a course of lectures.

The duration of the studentship shall depend upon the advisory committee being satisfied with the conduct and progress of the recipient, but shall normally be for two years, although in exceptional cases this time may be extended if the advisory committee consider it advisable. Each student is to forward to the advisory committee a report at the end of each year. The testator expressed the hope that any student not connected with any other college at Oxford shall, if possible, be admitted to Magdalen, but he shall not be entitled as a consequence to rooms in the college.

Claude's Attempt to Utilise Energy of Gulf Stream

THE French scientist, M. George Claude, developer of neon gas lights and important synthetic processes, is proceeding with an extensive investigation at Matanga, Cuba, to utilise the potential heat energy of the Gulf Stream. The surface water there is said to be 40 degrees warmer than the water 2,000 ft. below. Claude expects to develop a practical means of transferring this heat energy difference-potential and utilising it. The preliminary plans involve dropping a pipe line to the bottom to bring up the cold water, taking off the power through use of a turbine engine which takes advantage of the flow of vapour set free by the proximity of water at two different temperatures. Local engineers believe that his project probably includes search for gases present in the water at the ocean bottom.—U.S.A. Commercial Attaché Todd, Habana.

British Industries Fair, 1930

List of Chemical Exhibitors

THE following is a list of exhibitors in the section of chemicals, etc., at the British Industries Fair which is to be held in the new and reconstructed Olympia, London, from February 17 to 28, 1930:—

Albright and Wilson, Ltd., Oldbury; Allen, Frederick, and Sons (Poplar), Ltd., London; Aluminium Plant and Vessel Co., Ltd., London; Association of British Chemical Manufacturers, London; Ayrton, Saunders and Co., Ltd., Liverpool; Barnard's "Mascot" Inhalant Catarrh Cure, London; Beatl Sales, Ltd., London; Beetle Products Co., Ltd., London; Berton, Arthur, Ltd., London; Boake, A., Roberts and Co., Ltd., London; Bristow, T. F., and Co., Ltd., London; British Chemical Plant Manufacturers' Association, London; British Cyanides Co., Ltd., London; British Drug Houses, Ltd., London; Burgoyne, Burbidges and Co., Ltd., London; Burroughs, Wellcome and Co., London; Bush, W. J., and Co., Ltd., London; Calvert, F. C., and Co., Ltd., Manchester; Corfield, Ltd., London; Cussons, Sons and Co., Ltd., Manchester; Deptford Glassworks, Ltd., London; Dubarry Et Cie., Hove; Faudels, Ltd., London; Field and Co., London; Ford, T. B., Ltd., Loudwater; Gas Light and Coke Co., London; General Chemical and Pharmaceutical Co., Ltd., London; General Kaputine Syndicate, Ltd., Manchester; Graesser-Monsanto Chemical Works, Ltd., London; Grossmith, J., and Son, Ltd., London; Heppells, Ltd., London; Hill, Leonard, Ltd., London; Hope's Soaps (Chas. Midgley, Ltd.), Manchester; Hopkin and Williams, Ltd., London; Hopkin and Williams (Travancore), Ltd., London; Howards and Sons, Ltd., Ilford; Hulse, F., and Co., Ltd., Woodlesford; Imperial Chemical Industries, Ltd., London; Ingram, J. G., and Son, Ltd., London; Jackson, Ernest, and Co., Ltd., Crediton; Johnson and Sons, Manufacturing Chemists, Ltd., London; Jones, W. A., Ltd., Liverpool; Kerfoot, Thos., and Co., Ltd., Bardsley; Kestner Evaporator and Engineering Co., Ltd., London; Komposill Universal, Ltd., London; Lacco Proprietors, Ltd., London; Lovell, H. S., and Co., London; Macleans, Ltd., London; May and Baker, Ltd., London; Midgley, Charles, Ltd., Manchester; Mond Staffordshire Refining Co., Ltd., London; Morson, Thos., and Son, Ltd., London; Myosotis, Ltd., London; Northampton Polish Co., Ltd., Northampton; Payszu Soap Co., Ltd., London; Philli Mirano Co., Ltd.; Phil-Sano Co., Ltd., London; Redio Co., Ltd., Kingston-on-Thames; Roberts and Sheppey, London; Scrubb and Co., Ltd., London; Sheffield Stamping Co., London; Solport Bros., Ltd., London; South Metropolitan Gas Co., London; Spencer, Chapman, and Messel, Ltd., London; Swifto Manufacturing Co., Glasgow; Thermos (1925), Ltd., London; Thorium, Ltd., London; Tyrer, Thos., and Co., Ltd., London; Union Jack Paste Co., Seaford; Viscose Development Co., Ltd., Bromley; "Wee-Kura" Powder Co., Knaresborough; Whiffen and Sons, Ltd., London; White, R. F., and Co., Mitcham; Williams (Hounslow), Ltd., Hounslow; Windward Violet Farm, Dawlish; Wright, Layman and Umney, Ltd., London.

Notes on the individual exhibits will be published shortly.

Peace Uses of War Gases

SPEAKING of the peace uses to which poison gases might be applied, Mr. Raymond R. Butler, head of the Chemistry Department of the Plymouth Technical College, mentioned in the course of an address at Plymouth recently, that a number of the thousand poison gases which we had manufactured since the Armistice in 1918 had been utilised for civil purposes. Chlorine gas was a valuable bleaching agent and water purifier; chloropicrin (vomiting gas) had been used for destroying weevil and wharf rats; chloracetophenone (tear gas) had found a use in police control of mobs and civil disturbances; lead and calcium arsenates were now spread by means of aeroplanes over plantations where locusts infested the crops; and the boll-weevil pest in the Southern States of America was being attacked by poison from the air. Nevertheless the conquest of the air and the possibilities of chemical warfare made the war of the future a too diabolical affair to contemplate.

Chemical Matters in Parliament

Silk and Artificial Silk Works

IN reply to Sir H. Croft, as to the number of artificial silk factories built or commenced in the last five years, Mr. W. Graham (House of Commons, December 10), said that according to Press reports some 23 factories for making artificial silk had been established or re-equipped during the last five years. Of these it would appear, however, that only some 13 were actually working in October last. He had no information as to the numbers of persons employed in those particular factories, but the total numbers of persons estimated as employed in the silk and artificial silk industries in June, 1925, and June, 1929, were 42,750 and 67,573, respectively. Commander Bellairs asked whether the figures included extensions of factories as well, to which Mr. Graham replied that part of the answer referred to the re-equipment of factories, but, on the facts before him that afternoon, he should not like to be precise regarding extensions.

Phosgene Gas

Mr. Day (House of Commons, December 5) asked the Home Secretary whether he had seen the Report of the Committee of the Scientific Research Department on the subject of phosgene gas; whether any further safeguards for the protection of the public had been introduced; and whether the subject of the supply of a limited amount of gas masks to the police had been considered in the event of emergency? Mr. Clynes replied that he assumed the Report referred to was the Fourth Report issued early in the present year by the Committee on Gas Cylinders. This report was being supplemented by a further Report which it was expected would be issued shortly; and he was not in a position to say what additional precautions, if any, would be called for. There was nothing in the Report to suggest any necessity for the provision of gas masks for police.

Nitrate Production Restriction

Chilean Government's Decision

PROPOSALS have recently been under consideration for the restriction of the nitrate output in Chile during the next two years. The Chilean Government has now published its decision on the scheme. [The original proposals were published in THE CHEMICAL AGE last week.]

The alterations which the Government has introduced do not change the scheme fundamentally, but, in effect, make it more severe than it was in its original form. It was proposed by the producers that the output of the inefficient oficinas should be closed down up to a total of 400,000 tons per annum. The Government has raised the total to 500,000 metric quintals a month, or 600,000 tons per annum.

Applications for inclusion in the scheme are invited from Monday next, December 16, when the list will be opened in Valparaiso. The applications will be dealt with strictly according to the order in which they are received.

In the original scheme provision was made for subsidising the closed oficinas at the rate of 6d. per metric quintal, calculated on their 1928-29 output. The Government has decided that this subsidy shall not be paid. Instead, a concession will be made on the rate of property tax to be paid by those oficinas which are closed under the scheme. Details have not been published of this tax remission, but it is not expected to amount to as much as the original subsidy of 6d. per metric quintal. This modification of the scheme follows the same policy as that which prompted the Government to keep the whole industry under its direction, when, rather over 18 months ago, it decided to grant tax rebates, not tax remission, to the producers.

The production of the whole industry is to be linked closely to sales by regulating the individual producer's sales quota according to his production. For those oficinas closing under the scheme, a quota will be calculated on their output since July 1, the beginning of the current nitrate year.

Appointments Vacant

LONDON REPRESENTATIVE for large engineering company. Details on p. xxvii.

CHEMIST with experience in the manufacture of fine chemicals. Details on p. xxvii.

From Week to Week

SIR WILLIAM BRAGG has been elected a member of the Prussian Academy of Sciences.

MR. WALTER L. CHANCE, managing director of Chance Brothers and Co., Ltd., of Birminham, is at present in Melbourne.

THE BRITISH METAL CORPORATION, LTD., removed to new offices on Monday, December 9, and the address is now Princes House, 93, Gresham Street, London, E.C.2.

THE INSTITUTION OF THE RUBBER INDUSTRY is to form a West of England Section. The decision was made at a recent meeting at Trowbridge, convened by the council of the Institution.

MAJOR M. A. HUDSPETH, D.S.O., M.Sc., has been appointed mining engineer to the Safety in Mines Research Board, and has relinquished his post as Inspector of Mines in charge of the Yorkshire Division.

GERMAN REPARATIONS DELIVERIES OF FERTILISERS to France during the first six months of 1929 amounted to 55,360 tons, valued at $2,376,000. The fertilisers delivered were as follows: Ammonium sulphate, 32,232 tons; ammonium phosphate, 162 tons; sodium nitrate, 13,961 tons; nitrate of lime, 9,001 tons.

HOWARDS AND SONS, LTD., of Ilford, manufacturers of solvents, etc., announce that their works, warehouses, and offices will be closed on Wednesday and Thursday, December 25 and 26, for the Christmas holidays. The warehouse will be closed also on December 31 for stocktaking, and on that day no goods can be despatched or received.

THE KING OF SWEDEN presented the Nobel prizes to the recipients on Tuesday in Stockholm. Three Englishmen were among those honoured: Professor Arthur Harden, F.R.S. (Chemistry Prize for 1929, jointly with Professor Euler), Professor Sir Frederick Gowland Hopkins, F.R.S. (Medicine Prize for 1929, jointly with Professor Eijkman), and Professor O. W. Richardson, F.R.S. (Physics Prize for 1928).

THE SOCIETY OF GLASS TECHNOLOGY will hold its next meeting in the Science Museum, South Kensington, London, on Wednesday, December 18, at 2 p.m. The following papers will be presented and discussed:—"The Choice of Annealing Schedule for Commercial Glassware," by J. B. Murgatroyd; "The Strength of Glass Containing Cracks," by Lowell H. Milligan; "A Theory of the Strength of Thermally Toughened Glass," by Drs. J. T. Littleton and F.W. Preston. At 11.15 a.m. there will be a tour of the Science Museum.

THE BY-PRODUCTS WORKS constructed for British Benzol and Coal Distillation, Ltd., at Treharris, Glam., started work last week. The plant, however, will not be in full operation until the first month of the New Year, and the works will not be officially opened until then. Constructed by the Woodhall-Duckham company, the works will employ about 250 men, and will distil coal from the Bedwas Navigation Colliery, which adjoins the works. The manager of the works will be Mr. D. M. Hughes, a well-known figure in the Welsh by-product industry.

THE CHEMICAL SOCIETY will hold its next ordinary scientific meeting on Thursday, December 19, at 8 p.m., at Burlington House, London. The following papers will be read:—"The influence of hydrogen and of water vapour on the ignition of carbon monoxide," by A. Smithells, H. Whitaker and Miss T. Holmes; "The parachor and chemical constitution. Part XIV. Tellurium compounds," by F. H. Burstall and S. Sugden; "Studies in 'strainless' rings. Part II. The effect of transdecalin on the carbon tetrahedral angle," by K. A. N. Rao; "Synthesis of 1-2-thiol-histidine," by J. N. Ashley and C. R. Harington; and "2-Thiol-4(5)-β-aminoethyl glyoxaline (2-thiolhistamine)," by F. L. Pyman.

A FIRE broke out at the chemical works of John Riley and Sons, Hapton, near Burnley, in the sulphur distilling plant, on Saturday night, December 7. About eight o'clock a workman in the sulphur department heard an explosion, and found that many tons of sulphur had become ignited. The works' fire brigade attempted to deal with the outbreak, but it had got too good a hold, and the Padiham Brigade had to be summoned. The work of the firemen was considerably retarded by the poisonous fumes of the sulphur, but after two and a half hours the outbreak was extinguished. The damage to the building and plant is estimated at £500, and to the sulphur at a similar amount. The cause of the fire is unknown.

THE NEW CLUBHOUSE and recreation grounds provided by Imperial Chemical Industries for their workers at the Ardeer factory at Stevenston were presented by the directors to the recreation club on Saturday, December 7. The clubhouse was originally the mansion house of Ardeer Estate. There are lounge rooms for men and for women, a library, reading-room and committee rooms, a billiard room, a concert hall with accommodation for 750, a badminton hall, and a gymnasium. The grounds extending to 30 acres have been laid out with two football pitches, a cricket square and a hockey pitch, a sports enclosure, six tennis courts, and two bowling greens. Mr. John Rogers presided, and Sir Harry McGowan, the president of Imperial Chemical Industries, handed over the recreation grounds and clubhouse.

INDIAN INDIGO EXPORTS during September amounted to 44 cwt., as compared with 103 cwt. and 254 cwt. in September 1928 and 1927 respectively.

THE LIBRARY of the Chemical Society will be closed for the Christmas Holidays from Monday, December 23, at 9 p.m., until Monday, December 30, at 10 a.m.

DURING THE FIRST EIGHT MONTHS of 1929 French potash production, amounting to 318,450 metric tons, was 23 per cent., or nearly 60,000 tons, higher than in the corresponding period of 1928.

MR. L. A. MITCHELL, A.M.I.MECH.E., consulting and chemical engineer, announces that his address is now as follows: Harvester House, 37, Peter Street, Manchester Telephone, City 2705; telegraphic address, "Inspection, Manchester."

AT THE LAST MEETING of the Royal Institution, Sir James Crichton-Browne, on behalf of the members, presented Mr. Henry Young, late assistant secretary, with a silver rose bowl and cheque on his retirement after 50 year's service in the Institution.

ACCUSATIONS that the German High Command was paying special attention to the question of chemical warfare, in spite of the fact that Germany had ratified the Geneva Convention forbidding chemical warfare, were made in the French Chamber on Tuesday, during a consideration of the French War Ministry's estimates. The statement was denied at once in the Berlin Press.

A SENTENCE OF EIGHT MONTHS' imprisonment, and a fine of £250, were imposed upon a Polish engineer named Irlicht, at Cologne, for attempting to obtain information regarding I.G. processes of manufacture. He was also ordered to pay the I.G. £500 as an acknowledgment of his guilt. He was apparently particularly anxious to discover details of the manufacture of ultramarine.

"MERCURIO EUROPEO," the syndicate of the Spanish and Italian mercury producers, is endeavouring to find further markets for its product. The syndicate has therefore opened an international competition, with a prize of £5,000, for a new discovery which will permit of a wide application of mercury. Details of the competition, which is open to both scientific and technical workers, may be obtained from the office of Mercurio Europeo, Place St. François 5, Lausanne.

ALUMINIUM PRODUCED IN ITALY amounted, prior to 1914, to less than 1,000 tons annually, falling far short of the present demand (5,000 tons). The Società Italiana dell' Aluminio is building a plant of 6,000 tons-per-annum capacity at Mori (Trentino). The Montecatini company is building at Marghera a plant for the production of aluminium from bauxite by the Hägglund process, in order to avoid the need of coal. The Società Aluminio Veneto is also building a plant at Marghera, with an annual capacity of 1,500–2,000 tons.

LT.-COL. J. T. C. MOORE-BRABAZON stated at the meeting, on Monday, of "L and N" Coal Distillation, that the second and third units were on the site and were in process of being erected. The finance necessary to complete the alterations to the first plant and to install the second two had been arranged by means of a loan on the Leicestershire shares held by the company. The plant, he said, had performed its functions admirably at the start. Later, however, a series of unfortunate mechanical troubles had developed which had retarded them materially ever since. They had not been troubles connected with the process qua process, nor could they be construed into any criticism of the system as a whole. From the intermittent running of the plant during the year, very valuable experience had been gained, and the plant was now running. Although the delay had retarded the interests of shareholders, it had brought them a year nearer the commercial running of the plant.

A CARTEL OF MANUFACTURERS of asbestos cement building products has been formed in Europe. This is announced by the directors of Turner and Newall, Ltd., in their annual report, issued on Wednesday. The report states that the amalgamation with the Bell group has proved a satisfactory alliance, and has enabled steps to be taken to rationalise the asbestos industry of this country. One result has been that in an important branch of its manufactures—*i.e.*, asbestos cement building products—Turner and Newall, Ltd. has become such a large part of the nation's entire industry that the directors have been able to arrange with the principal manufacturers of ten European countries an international cartel. The European countries participating in this cartel are Great Britain, Czechoslovakia, Belgium, France, Holland, Austria, Italy, Hungary, Spain, Switzerland, and Germany. The objects of this cartel are, inter alia:—The exchange of technical knowledge; the establishment in Switzerland of an institute of research for the entire industry; the foundation of new factories in neutral countries; the organisation of the export business; the standardisation of quality, and minimising unnecessary variety in the product; and mutual assistance in securing the necessary raw materials on the best terms.

Obituary

DR. LOUIS LEWIN, the eminent toxicologist of Berlin, on December 1, aged 79. He was the author of numerous well-known books, including a text-book of toxicology which this year reached its fourth edition under the new title *Gifte und Vergiftungen*.

References to Current Literature

British

GENERAL.—Germanium. VI.—An improved method of extracting Germanium from germanite. W. Pugh. *Journ. Chem. Soc.*, November, pp. 2540–2542.

The effects of bicarbonate ions on the swelling of gelatin. E. G. Miller, Jun. *Biochem. Journ.*, Vol. XXIII, No. 5, pp. 876–879.

INSULIN.—A reversible inactivation of insulin. F. H. Carr, K. Culhane, A. T. Fuller and S. W. F. Underhill. *Biochem. Journ.*, Vol. XXIII, No. 5, pp. 1010–1021. Insulin can be completely inactivated by treatment with ethyl alcohol and hydrochloric acid. Complete recovery of potency occurs on treatment with dilute sodium hydroxide. The inactivation is thought to be due to esterification.

ORGANIC.—The dinitration of *m*-dichlorobenzene. A. I. Dann. *Journ. Chem. Soc.*, November, pp. 2460–2462.

Synthesis of anthracene homologues. II.—2 : 3 : 6-Trimethylanthracene. G. T. Morgan and E. A. Coulson. *Journ. Chem. Soc.*, November, pp. 2551–2559. The above compound has been synthesised, and its quinone obtained by oxidation. The heavy neutral oils of low-temperature tar from bituminous coal contain a mixture of anthracene derivatives which includes the 2 : 3 : 6-derivative mentioned.

TEXTILES.—The influence of humidity on the elastic properties of cotton. F. H. Clayton and F. T. Peirce. *Journ. Textile Inst.*, November, pp. 315–332T.

Further studies of the microbiology of wool: The enhancement of "mildew" by soaps and vegetable oils. R. Burgess. *Journ. Textile Inst.*, November, pp. 333–372T.

German

ANALYSIS.—The detection and determination of lead in ethyl petrol. H. Kiemstedt. *Zeitschrift angewandte Chem.*, November 30, pp. 1107–1108.

The distinction of "Cellon" from "Cellophane." G. Sandor. *Zeitschrift angewandte Chem.*, November 30, p. 1108. These two products may be distinguished by a method based on fluorescence in ult.aviolet light.

APPARATUS.—Small gas muffle furnaces. F. W. Horst. *Chemische Fabrik*, December 4, p. 513.

CELLULOSE.—The determination of the viscosity of cellulosic raw materials by isothermal working-up to viscose. R. Weingand and E. Acker. *Kunstseide*, November, pp. 419–424.

DYEING.—The dyeing of acetate silk: Colour and sheen. H. Brandenburger. *Kunstseide*, November, pp. 425–430. Discusses the conceptions of colour and lustre, and considers the relations between the Ostwald theory of colour and the new and extended Klughardt theory.

GELATIN.—The effect of the treatment of gelatin on the viscosity of its solutions. C. E. Davis and H. M. Salisbury. *Kolloid-Zeitschrift*, November, pp. 270–275. Includes an exact method for the determination of the viscosity of gelatin solutions.

PHOTOGRAPHY.—Bromide oil prints. I. and II. K. Schuch. *Chemiker-Zeitung*, November 20, pp. 897–899; November 27, p. 914.

PIGMENTS.—Physical tests on pigments. F. Schmid. *Zeitschrift angewandte Chem.*, November 30, pp. 1101–1107. Discusses the scientific foundations for the determination of brightness, covering power and colouring power; and suggests improvements in the present methods, as well as new methods of determination.

PLANT.—Refrigerator compressors. *Chemiker-Zeitung*, November 27, pp. 915–916.

The use of turbo-blowers in long-distance gas transmission. E. Blau. *Chemiker-Zeitung*, December 4, pp. 933–935.

Recent works organisation in a mineral oil washing plant. B. Müller. *Chemiker-Zeitung*, December 4, p. 935.

Miscellaneous

ANALYSIS.—The determination of rare metals and their separation from other metals. XVI.—The separation of thallium from tri- and tetra-valent metals. L. Moser and W. Reif. XVII.—The precipitation of tungsten with tannin and antipyrin, and its separation from the di- and tri-valent elements, from tin, and from silicic acid. L. Moser and W. Blaustein. *Monatshefte*, Vol. 52, Part 5, pp. 343–350, 351–364 (in German).

CEMENT, ACID-PROOF.—Studies on acid-proof cement mortars. III.—S. Nagai. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 294–295B (in English).

COMBUSTION.—The temperature of spontaneous ignition of gaseous mixtures of air and hydrocarbons. The effect of pressure and of preheating. P. Mondain-Monval and B. Quanquin. *Comptes Rendus*, November 25, pp. 917–919 (in French).

The spark ignition of low inflammable gas mixtures. K. Yumoto. *Proceedings Imp. Acad. Japan*, October, pp. 318–321 (in English).

DYESTUFFS.—The action of aromatic sulphochlorides on β-aminoanthraquinone (A contribution to the knowledge of some new vat dyes). E. Riesz and R. Feiks. *Monatshefte*, Vol. 52, Part 5, pp. 372–376 (in German). *p*-Toluenesulphochloride reacts with β-aminoanthraquinone, giving, as one of the products, a substance having the properties of a vat dye, for which a structure containing three anthraquinone groups, linked by two NH groups, is suggested. Similar compounds were obtained by the action of various other aromatic sulphochlorides on β-aminoanthraquinone.

FERTILISERS.—The production of rational fertilisers from phosphoric acid. C. Matignon. *Chimie et Industrie*, November, pp. 860–867 (in French).

GENERAL.—The effect of high temperatures on some metallic sulphides. M. Picon. *Bulletin Société Chimique France*, October, pp. 907–913 (in French).

Studies on a new process for making manganese dioxide. I.—II.—Properties of the product. Y. Kato and T. Matsuhashi. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 313–314B (in English). The process is based on the oxidation of lower oxides of manganese with free oxygen nnder the catalytic action of alkali at higher temperatures.

The distillation of lignite, peat and wood. E. Marcotte. *Chimie et Industrie*, November, pp. 877–889 (in French).

A new method for the treatment of mixed minerals in the wet way. A. Glazunov. *Chimie et Industrie*, November, pp. 890–892 (in French).

HYDROGENATION.—The fission of some naphthylmethane derivatives during hydrogenation under pressure. W. N. Ipatieff and B. N. Dolgoff. *Bulletin Soc. Chim. France*, October, pp. 950–961 (in French).

OILS.—Negative catalysts of the hardening of fatty oils. VIII.—S. Ueno and T. Yukimori. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 318–321B (in English).

OILS, TRANSFORMER.—Influence of added sulphur upon the oxidation of less refined transformer oils. S. Mizushima and T. Yamada. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 316–317B (in English).

A study of the sludge of transformer oils. I.—A consideration of the formation factors of sludge. T. Yamada. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, p. 317B (in English).

ORGANIC.—A new general method of preparation of primary and secondary amines. A. Guyot and M. Fournier. *Comptes Rendus*, November 25, pp. 927–929 (in French).

Studies on the thermal decomposition of coal tar constituents. V.—Reaction products of the thermal decomposition of toluene. VI.—Reaction mechanism of the thermal decomposition of toluene. Y. Kosaka. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 298–299B, 299–300B (in English).

The velocity of decomposition of indanthrene in alkali fusion. T. Maki. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 300–303B (in English).

The alkali fusion of 2-aminoanthraquinone at 150° C. T. Maki. *Journ. Soc. Chem. Ind. Japan* (supplemental binding), November, pp. 303–305B (in English).

WOOD DISTILLATION.—The treatment of pyroligneous acid: Removal of tar, saturation, extraction and rectification of acetic acid and alcohol. C. Mariller. *Chimie et Industrie*, November, pp. 868–876 (in French).

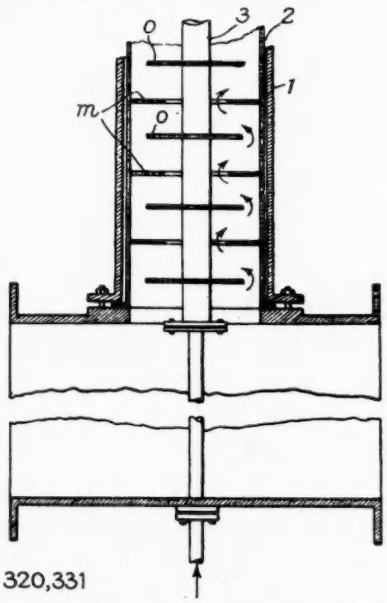
Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Complete Specifications

320,331. ALKALI SOAPS, INCLUDING AMMONIUM SOAP, AND THE FATTY ACID OBTAINED THEREFROM, PROCESS FOR THE PRODUCTION OF. V. Graubner, 7, Frein heitsplatz, Mahr-Ostrau, Czecho-Slovakia. Application date, April 4, 1928.

In the production of soaps, a mixture of molecular proportions of fat, alkali, and water is passed under pressure in thin streams in a zig-zag path in contact with a heated body.



320,331

The apparatus consists of upper and lower collecting vessels connected by an arrangement consisting of three co-axial pipes. The illustration shows the lower half of one element of the apparatus. The inner pipe 3 is provided with spaced baffles *o* which are heated by steam passed through the pipe. The pipe 2 is provided with annular baffles *m* arranged alternately with the baffles *o* and an outer protecting casing 1 surrounds the pipe 2. The mixture of fat, alkali, and water is forced through the apparatus by means of a pump or injector, and the resulting soap is discharged through a nozzle in highly divided form. The soap may be distributed in a hot solution of sodium chloride, or into an acid solution to obtain fatty acid and glycerine.

320,345. XANTHEN DYES, PROCESS FOR THE MANUFACTURE OF. Imperial Chemical Industries, Ltd., Millbank, London, S.W.1, A. Coulthard, and E. H. Rodd, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, July 7, 1928.

Specification No. 314,825 (see THE CHEMICAL AGE, Vol. XXI., p. 135) describes the production of dyes by condensing 3:7-tetra-alkyl-diamino-xanthones with aromatic halogen compounds by means of sodium. It is now found that the xanthones can be condensed by means of phosphoryl chloride or bromide, phosphorus trichloride or pentachloride, phosphorus tribromide, carbonyl chloride, and other reagents capable of replacing the ketonic oxygen of the xanthone. The dyes are much more highly basic than the Rhodamine. dyes. The basic dyes can be sulphonated to yield acid dyes of the xanthene series if a suitable aromatic amine is chosen for the condensation. An example is given of the condensation of 3:7-tetra-methyl-diamino-xanthone and ethyl-α-naphthylamine with phosphoryl chloride. If *p*-tolyl-*m*-phenetidine is employed instead of ethyl-α-naphthylamine, a basic dye is obtained which is less soluble, and its sulphonation is described. Details are given of the dyeing of cotton, wool, and acetate silk.

320,359. DYESTUFFS, MANUFACTURE OF. S. W. Dunworth, J. Thomas, and Scottish Dyes, Ltd., Earl's Road, Grangemouth, Stirling. Application date, July 9, 1928.

The object is to obtain dyestuff powders in a more finely divided form than is possible by grinding them with water and then drying the aqueous paste, or by grinding the solid material in the dry state. In this invention the dry dyestuff, such as is obtained by removing by heat the water from the watery paste with or without soaps or other dispersing agents, is ground with ether, carbon disulphide, methyl alcohol, ligroin, petroleum ether, acetone, or other low boiling liquid. Examples are given of the treatment of Caledon Brilliant Blue R, Standard Paste, Caledon Blue GC, Caledon Brilliant Purple RR, and others. The process is particularly suitable for use with vat dyestuffs and dyestuffs for cellulose acetate.

320,362. ARTIFICIAL RUBBER, PRODUCTION OF. J. Y. Johnson. London. From I.G. Farbenindustrie Akt-Ges., Frankfort-on-Main, Germany. Application date, March 30, 1928.

The object is to obtain artificial rubber from natural materials such as coal, distillation products, tars, mineral oils, natural gas, or methane. The initial material is first converted into methane, which is then converted into acetylene preferably by treatment in an electric arc, or by passing it at 700°–1,000° C. over catalysts consisting of metals which are trivalent or have a higher valency, from the third to the sixth group, or compounds of manganese, iron, nickel, or cobalt. Alternatively, acetylene may be produced by subjecting hydrocarbons for a very short time to the action of high temperatures. A number of other methods are given by which acetylene may be obtained. The acetylene may then be concentrated by absorbing it in cyclo-hexanol and then converted into acetaldehyde by the action of aqueous solutions of mercuric salts. Alternatively, the acetylene may be passed with water vapour at 200°–400° C. over a catalyst consisting of a salt of phosphoric or boric acid, or a compound of tin, silver or vanadium. The acetaldehyde may be recovered by cooling the gases to 15° C., or by passing them over silica gel or active carbon, or through solvents. The acetaldehyde is then polymerised to aldol by means of aqueous solutions of alkali metal carbonates, caustic alkalies, barium hydroxide, potassium cyanide, or sodium sulphite. The aldol is then subjected to reducing treatment to convert it into 1 : 3-butylene-glycol, either by electrolytic reduction, or by treating it in liquid form or solution at a pressure up to 100 atmospheres together with hydrogen, in the presence of a hydrogenation catalyst consisting of nickel, cobalt, or copper, with an activating addition such as aluminium oxide. The reaction is preferably effected at 50°–110° C. Alternatively, the reduction may be effected by treating an aqueous acidified solution of aldol with sodium or aluminium amalgam. The 1 : 3-butylene-glycol is then converted into methylethyl-ketone by partial dehydration by passing the vapour at 180°–250° C. over a heavy metal which may be activated by oxides, hydroxides, carbonates, formates, acetates, oxalates, phosphates, or silicates of the alkaline earth metals. A catalyst obtained by the reduction of basic copper carbonate is preferably used. The methylethyl-ketone is then condensed with formaldehyde to form methyl-2-ketone-3-butanol according to the equation

$$CH_3.CO.CH_2.CH_3. + H_2CO \rightarrow CH_3.\overset{O.}{\overset{\|}{C}}—\overset{CH_3}{\overset{|}{C}}H.CH_2.OH$$

The condensation is effected by the aid of potassium carbonate or hydroxide, or sodium alcoholate. The condensation product is then converted by reduction in a gaseous or liquid state into 2-methyl-1 : 3-butylene-glycol, *e.g.*, by means of hydrogen and hydrogenating catalysts.

This product is converted by means of a dehydrating process into isoprene by passing the vapour at 150°–500° C. over catalysts consisting of neutral or acid salts of phosphorus acids,

preferably with the addition of small amounts of non-volatile free acids. The isoprene may then be polymerised by means of ultra-violet light, or by heating with caustic alkali or water under pressure to about 100° C., or by treating with metallic sodium or an alkaline earth metal. Alternatively, the isoprene may be polymerised with the aid of oxidising agents such as hydrogen peroxide, inorganic peroxides or organic compounds yielding oxygen. Several other methods of polymerisation are also given The plastic product is similar to rubber.

320,375. ANTHRAQUINONE AND ITS DERIVATIVES, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application dates, July 6, September 28, October 1 and 11, and December 10, 1928.

The products obtained by condensing one molecular proportion of an α-naphtho-quinone which may be substituted in the benzene nucleus with one molecular proportion of a 1 : 3-butadiene hydrocarbon, or the products obtained by condensing one molecular proportion of *p*-benzoquinone with two molecular proportions of a 1 : 3-butadiene hydrocarbon in a molten state or in neutral or alkaline media, are treated with agents capable of splitting off hydrogen by oxidation. Suitable neutral or alkaline media include water, alcohols, hydrocarbons, heterocyclic compounds, and caustic alkalies. The process can be accelerated by the use of catalysts transferring oxygen, *e.g.*, compounds of copper, cobalt, nickel, iron, etc. Agents which split off hydrogen by oxidation include air, oxygen, hydrogen peroxide, potassium permanganate, perborates, etc. In this manner a mixture of 2 : 6- and 2 : 7-dimethyl-anthraquinone is obtained by boiling the condensation product of one molecular proportion of benzo-quinone with two molecular proportions of isoprene with a solution of caustic alkali in the presence of oxygen. Similarly anthraquinone is obtained from the condensation product from α-naphthoquinone and 1 : 3-butadiene. If the above treatment is carried out under milder conditions, preferably in the absence of agents splitting hydrogen by oxidation, or if the condensation products are treated with acid media, intermediate products are obtained, *e.g.*, condensation products of an α-naphthoquinone and a 1 : 3-butadiene yield phenolic compounds which are 1 : 4-dihydro-9 : 10-dihydroxy-anthracenes. These are new compounds which can be melted or sublimed in vacuo without decomposition, and are soluble in hot water, and in low-boiling and high-boiling organic liquids. The 1 : 4-dihydro-9 : 10-dihydroxy-anthracenes can be dehydrogenated into the 1 : 4-dihydroxy-anthraquinones by ferric chloride solution, or air supplied in an alkali metal carbonate solution. Numerous examples are given.

320,397. N-DIHYDRO-1 : 2 : 2^1 : 1^1-ANTHRAQUINONE-AZINE AND DERIVATIVES THEREOF FAST TO CHLORINE, PRODUCTION OF. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application dates, July 11, November 12, 1928, and March 25, 1929.

N-dihydro-1 : 2 : 2^1 : 1^1-anthraquinone-azine which is not fast to chlorine owing to the presence of impurities is treated with manganese dioxide or other oxides of manganese higher than manganous oxide, in the presence of sulphuric acid containing not more than 33 per cent. of water. The process is also applicable to those derivatives of N-dihydro-1 : 2 : 2^1 : 1^1-anthraquinone-azine which contain one or more methyl groups in one or both of the anthraquinone nuclei. Sulphonic acids of N-dihydro-1 : 2 : 2^1 : 1^1-anthraquinone-azine can also be purified by this process. Several examples are given.

320,406. CHLORINATION OF HYDROCARBONS. E. E. Ayres, Junr., c/o The Sharples Specialty Co., 23rd and Westmoreland Streets, Philadelphia, Pa., U.S.A. Application date, July 12, 1928.

The object is to chlorinate hydrocarbon vapours without risk of explosion. Hydrocarbons capable of existing in vapour phase at temperatures at which the rate of reaction with chlorine is low are chlorinated by introducing one vapour into the other while maintaining one of them at a velocity sufficiently high to prevent ignition, or persistence of ignition, at the mixing point. It has been found that ignition does not occur if chlorine enters a stream of hydrocarbon vapour moving at a velocity greater than one half of that required for turbulent flow of the mixture. The temperature must be such that the velocity of reaction is low. The velocity which produces turbulent flow may be determined by cooling the exterior of the conduit by a water jacket and placing two thermometers with their bulbs at the centre and near the periphery of the conduit, respectively. The velocity is increased until the two thermometers indicate practically the same temperature, which indicates a turbulent flow. The chlorine vapour and hydrocarbon vapour may be previously mixed and introduced into the reaction apparatus under such conditions that chlorination does not occur in transit. Thus, chlorine may be introduced into a stream of pentane vapour moving at a speed of 50 ft. a second in a conduit less than 8 in. in diameter without ignition occurring. Particulars are also given of the chlorination of methane.

320,409. YELLOW FERRIC HYDROXIDE, MANUFACTURE OF, A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date. July 12, 1928.

Ferric hydroxide, FeO.OH, is obtained in the form of a pigment of high covering power by subjecting a precipitate containing ferrous hydroxide or ferrous carbonate to oxidation above 40° C., in the presence of a salt of a trivalent metal, or a suspension of the hydroxide obtained from the salt by the action of a base. A ferric salt or a suspension of ferric hydroxide or ferrous hydroxide or carbonate treated with a solution of a ferric salt would be suitable. Thus, ferrous hydroxide or ferrous carbonate is precipitated from a ferrous salt solution by an alkaline reagent, a ferric salt solution is then added, and then sodium carbonate solution till the solution remains neutral. A slow stream of gas containing oxygen may be passed through, or sufficient ferric salt may be used to act as the oxidising agent. Several examples of the production of these pigments are given.

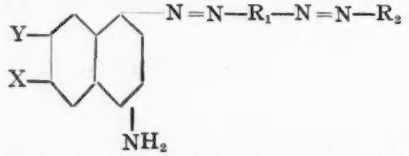
NOTE.—Abstracts of the following specifictions, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention :—293,829 (C. J. Pratt), relating to distilling and cracking oil, see Vol. XIX, p. 267 ; 295,399 (Standard Oil Development Co.), relating to cracking oil, see Vol. XIX, p. 347 ; 301,087 (Schering Kahlbaum Akt.-Ges.), relating to thymol and menthol, see Vol. XX, p. 83 ; 305,536 (Newport Co.), relating to purification of benzanthrones, see Vol. XX, p. 360.

International Specifications not yet Accepted

318,991–2. DYEING. E.I. du Pont de Nemours and Co., Wilmington, Del., U.S.A. (Assignees of H. Jordan 1111, Franklin Street, Wilmington, Del., U.S.A.) International Convention date, September 11, 1928.

318,891. Viscose is dyed in level shades with disazo dyestuffs of the type $R_1 \rightarrow R_2 \rightarrow R_3$ in which R_1 is a naphthylamine monosulphonic acid, R_2 is an aromatic residue not containing a free hydroxyl or amino group, and R_3 is J-acid or an N-substituted derivative. As an example, 1-naphthylamine-7-sulphonic acid→*m*-toluidine,→J-acid is mentioned.

318,892. Viscose is dyed in level violet-blue shades with disazo dyes of the formula



where R_1 is an aromatic residue not containing a free hydroxyl or amino group, R_2 is J-acid or an N-substituted derivative, X is hydrogen or a sulphonic group, and Y is a sulphonic group or hydrogen, but not more than one sulphonic group in the nucleus. As an example, the hydrolysed dyestuff 1-acetylamino-4-aminonaphthalene-6-sulphonic acid→1-naphthylamine-6-sulphonic acid→phenyl J-acid is mentioned.

319,727. HYPOCHLORITES. Mathieson Alkali Works, 250, Park Avenue, New York. (Assignees of R. B. MacMullin, Niagara Falls, N.Y., U.S.A.) International Convention date, September 27, 1928.

Caustic soda and calcium hydroxide in a solution saturated with respect to sodium chloride, and in the proportions of 2 : 1, are chlorinated under such conditions of temperature and concentration that sodium chloride only separates during chlorination. The sodium chloride is removed, and the remaining triple salt $Ca(OCl.)_2,NaOCl,NaCl.12H_2O$ is

crystallised out. The mother liquor may be used again in the process. A temperature of 0°–12° C. is suitable for the chlorination, and the triple salt is crystallized at 0° C. It is stable below 22° C. and may be used for bleaching.

Specifications Accepted with Date of Application

297,777. Perborates, Process of producing. Roessler and Hasslacher Chemical Co. September 27, 1927.

298,611. Denaturing alcohol. I.G. Farbenindustrie Akt.-Ges. October 12, 1927.

300,633. Hardening iron and steel articles by nitrogenation. P. F. M. Aubert, A. J. P. Duval and H. A. M. Duval (trading as Aubert et Duval Frères). November 17, 1927.

298,494. Dyestuffs containing metal, Manufacture of. Soc. of Chemical Industry in Basle. October 8, 1927.

301,734. Concentration of lower aliphatic acids. British Celanese, Ltd. December 3, 1927.

302,599. Azo-dyestuffs insoluble in water, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 17, 1927.

303,066. Nickel-copper matte, Method of refining. F. E. Lathe. December 27, 1927.

303,347. Catalysts, and process of making same. J. P. P. Mayor. December 31, 1927.

304,282. Anhydrous stannic chloride from metals containing tin. G. A. Favre. January 18, 1928.

305,136. Vat dyestuff, Manufacture of. F. Bensa. January 31, 1928.

308,249. Rubber, Treatment of. Goodyear Tire and Rubber Co. March 20, 1928.

309,155. Fuel containing alcohol, Manufacture of. W. Steiger. April 7, 1928.

321,914. Coating metallic or non-metallic bodies with chromium. S. G. S. Dicker. (*Naamlooze Vennootschap Philips' Gloeilampenfabrieken*). July 9, 1928.

321,916. Anthraquinone and benzanthrone carboxylic acids, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) July 16, 1928.

321,927. Froth-flotation concentration of ores and the like. P. T. Williams and Minerals Separation, Ltd. August 18, 1928.

321,929. Treating heavier hydrocarbons, Processes and apparatus for. C. A. Jensen. (*Jenkins Petroleum Process Co.*) August 20, 1928.

321,936. Ferro-aluminium alloys. S. G. S. Dicker. (*Soc. Aubert et Duval Frères.*) August 14, 1928.

321,919. Recovering sulphur from gaseous mixtures containing sulphur vapours. H. D. Elkington. (*Comstock and Westcott Inc.*) May 17, 1928.

321,943. Ores, Treatment of. S. G. S. Dicker. (*Bradley-Fitch Co.*) June 19, 1928.

321,920. Recovering sulphur and iron oxide from iron-containing sulphide ores or the like. H. D. Elkington. (*Comsock and Westcott, Inc.*) May 17, 1928.

321,959. Compounds of diphenolisatins, Process for the manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) August 22, 1928.

321,968. Halogen substituted amino-benzoic acid alkamine esters, Manufacture of. W. P. Williams. (*Schering-Kahlbaum Akt.-Ges.*) July 23, 1928.

321,974. Quinoline compounds containing an aliphatic amino substituted side-chain, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) August 21, 1928.

321,980. Heavy metal salts of oil-soluble sulphonic acid and drying oil compositions, paints, varnishes and the like, containing such salts. C. Arnold. (*Standard Oil Development Co.*) August 23, 1928.

321,982. Purification of industrial gases with the recovery of by-products. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) August 23, 1928.

322,005. Sulponic acids, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 1, 1928.

322,008. Vat dyestuffs of the anthraquinone series, Manufacture of. O. Y. Imray. (*I.G. Farbenindustrie Akt.-Ges.*) September 3, 1928.

322,029. Higher alcohols, acetone, and the like, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 19, 1928.

322,036 and 322,057. Triaryl phosphates, Manufacture of. Imperial Chemical Industries, Ltd., W. Gibson, C. R. Henshaw and J. B. Payman. September, 27, 1928, and October 24, 1928.

322,037. Monoalkyl ethers of ethylene glycol, Manufacture of. Imperial Chemical Industries, Ltd., W. Gibson and J. B. Payman. September 27, 1928.

322,039. Finely divided metal powders obtained from carbonyls, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) September 28, 1928.

322,049. Removal of ammonia from coal distillation gases. D. Tyrer and Imperial Chemical Industries, Ltd. October 13, 1928.

322,082. Removal from metal powders of the impurities which form volatile compounds with oxygen. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) November 17, 1928.

322,102. Polymerisation products of α-butylene and of trimethylethylene, Manufacture of. J. Y. Johnson. (*I.G. Fargenindustrie Akt.-Ges.*) December 1, 1928.

322,114. Synthetic rubber. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) December 17, 1928.

Applications for Patents

[*In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.*]

Armenault, R., Fabriques de Produits de Chimie Organique de Laire, and Malet, J. Condensing urea with formaldehyde, etc. 37,484. December 6. (France, December 6, 1928.)

Arnold, C., and Dow Chemical Co. Purification of magnesium, etc., alloys. 37,379. December 5.

Barnes, R. S., Scottish Dyes, Ltd., and Thomas, J. Dyes and dyeing. 37,336, 37,337. December 5.

Barnes, R. S., Scottish Dyes, Ltd., Thomas, J., and Wylam, B. Vat dyestuffs. 37,627. December 7.

Caro, N. Preparation of calcium cyanamide. 37,181. December 4. (Germany, December 6, 1928.)

—— Preparation of concentrated nitric acid. 37,531. December 6. (Germany, December 6, 1928.)

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Preservation of rubber, etc. 36,930. December 2.

—— Manufacture of dyestuffs. 37,393. December 5.

—— Manufacture of paints. 37,534. December 6.

Coley, H. E. Reduction of ores, etc. 37,281, 37,282. December 5.

—— Extraction of oil from shale. 37,604. December 7.

Elkington, H. D. and Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Manufacture of ammonium sulphate. 37,528. December 6.

—— Manufacture of products from coal, etc. 37,529. December 6.

—— Manufacture of acetone. 37,530. December 6.

Fletcher, P., Purser, W. B., Imperial Chemical Industries, Ltd., McAulay, J., and Wheeler, T. S. Manufacture of hydrocyanic acid. 37,596. December 7.

Groves, W. W. and I.G. Farbenindustrie Akt.-Ges. Manufacture of photographic surfaces. 36,904. December 2.

Hall, A. J., Mason, F. E. and Silver Springs Bleaching and Dyeing Co., Ltd. Manufacture of dye preparations. 37,419. December 6.

Holliday and Co., Ltd., L. B., and Kilsdonk, A. T. Production of anthraquinone. 37,408, 37,409. December 6.

Holzverhohlungs-Industrie Akt.-Ges. Production of ketones. 37,028 December 3. (Germany, January 25.)

I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of crimped artificial fibres, etc. 37,479. December 6.

I.G. Farbenindustrie Akt.-Ges. Kinematograph apparatus. 36,911. December 2.

—— Manufacture of vat dyestuffs, etc. 36,915. December 2. (Germany, December 1, 1928.)

—— Manufacture of coloured polyvinyl ester varnishes. 37,045. December 3. (Germany, December 3, 1928.)

—— Manufacture of viscose. 37,046. December 3. (Germany, December 3, 1928.)

—— Manufacture of halogenated dibenzopyrene-quinones. 37,187. December 4. (Germany, December 4, 1928.)

—— Manufacture of polyvinyl ester varnishes. 37,335. December 5. (Germany, December 5, 1928.)

—— Manufacture of halogenated 4:5:8:9 dibenzo pyrene-3:10-quinones. 37,483. December 6. (Germany, December 6, 1928.)

—— Condenser for film projectors. 37,485. December 6. Germany, December 17, 1928.)

—— Photographic roll-films. 37,608. December 7. (Germany, December 7, 1928.)

Imperial Chemical Industries, Ltd. Coating-compositions. 37,629. December 7. (United States, December 7, 1928.)

Lutz, G. Carrying out gaseous chemical reactions. 37,520. December 6.

Orbis Products Trading Co., Inc. Production of thymol and menthone. 37,360. December 5. (United States, December 5, 1928.)

Rheinische Kampfer-Fabrik Ges. Preparation of inactive menthol. 37,532. December 6. (Germany, January 28.)

Ruhrchemie Akt.-Ges. Production of mixtures of methane, etc., for treatment of metals. 37,526. December 6. (Germany, December 6, 1928.)

Scottish Dyes, Ltd., and Thomas, J. Production of condensation products. 37,194. December 4.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £23 per ton; powder, £24 per ton; extra fine powder, £26 per ton. Packed in 2 cwt. bags carriage paid any station in Great Britain.

ACID, CHROMIC.—1s. 1½d. per lb.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

AMMONIUM BICHROMATE.—8½d. per lb.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER.—Spot, £9 10s. per ton d/d; Contract, £8 10s. per ton d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystals, £19 10s. to £20 per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 to £5 5s. per ton d/d carr. paid.

CHROMIUM OXIDE.—10d. and 10½d. per lb. according to quantity.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 3d. to 1s. 8d. per gall. pyridinised industrial, 1s. 5d. to 1s. 10d. per gall.; mineralised 2s. 4d. to 2s. 8d. per gall.; 64 O.P., 1d. extra in all cases.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS.—4¾d. per lb. nett d/d U.K. spot; ground ½d. per lb. extra.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—8¼d. per ld.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton, ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton. carr. paid.

SODIUM BICHROMATE CRYSTALS, CAKE AND POWDER.—3¾d. per lb. nett d/d U.K. spot. Anhydrous ¾d. per lb. extra.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.r. London.

SODIUM CHLORATE.—2½d. per lb.

SODIUM CHROMATE.—3½d. per. lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.b. London, 1-cwt. kegs included.

Coal Tar roducts

ACID CARBOLIC CRYSTALS.—7d. to 10d. per lb. Crude 60's, 2s. 5½d. to 2s. 6d. per gall.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 7d. per gall. Pure, 5s. 6d. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 2s. 2d. to 2s. 5d. Dark, 1s. 6d. to 2s. 2d. Refined, 2s. 7d. to 2s. 10d. per gall.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4¾d. to 5¼d. per gall. 1100, 5¼d. to 6d. per gall.; 1110, 6d. to 6¼d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 2s. 1d. per gall. Firm. Pure, 1s. 11d. to 2s. 4d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, 6¼d to 6½d. per gall. Middle oil, 4½d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 2d. to 2½d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8¼d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent 90/190, 1s. to 1s. 3d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £4 10s. to £5 per ton. Whizzed, £5 per ton. Hot pressed, £8 10s. per ton.

NAPHTHALENE.—Crystals, £12 5s. per ton. Purified Crystals, £14 10s. per ton. Quiet. Flaked, £14 to £15 per ton, according to districts.

PITCH.—Medium soft, 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID BENZOIC.—1s. 8½d. per lb.

ACID GAMMA.—4s. 6d. per lb.

ACID H.—3s. per lb.

ACID NAPHTHIONIC.—1s. 6d. per lb.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb.

ACID SULPHANILIC.—8½d. per lb.

ANILINE OIL.—8d. per lb. naked at works.

ANILINE SALTS.—8d. per lb. naked at works.

BENZALDEHYDE.—2s. 3d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots d/d.

p-CRESOL 32/34° C.—2s. per lb., in ton lots d/d.

DICHLORANILINE.—1s. 10d. per lb.

DIMETHYLANILINE.—1s. 11d. per lb.

DINITROBENZENE.—8d. per lb. naked at works. £75 per ton.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 7½d. per lb. naked at works. 66/68° C, 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—10d. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb.

B-NAPHTHYLAMINE.—3s. per lb.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 8d. per lb.

NITROBENZENE.—6d. per lb. naked at works.

NITRONAPHTHALENE.—1s. 3d. per lb.

R. SALT.—2s. 2d. per lb.

SODIUM NAPHTHIONATE.—1s. 8½d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb.

p-TOLUIDINE.—1s. 9d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 6d. per lb. 100%.

N. W. ACID.—4s. 9d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall, 32° Tw. 1s. per gall. 24° Tw.

WOOD CRESOTE.—1s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d. per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton.

BROWN SUGAR OF LEAD.—£38 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb. according to quality; Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 10d. to 2s. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—5s. to 6s. per lb.

CARBON BISULPHIDE.—£25 to £27 10s. per ton, according to quantity

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£10 to £13 per ton, according to quality.

SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra

SULPHUR PRECIP. B. P.—£55 to £60 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb., carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton ex wharf London, barrels free.

ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.

ACID, BENZOIC, B.P.—2s. to 3s. 3d. per lb., according to quantity. Solely ex Gum, 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

ACID, BORIC B.P.—Crystal, £32 per ton; powder, £36 per ton; extra fine powder, £38 per ton. Packed in 2-cwt. bags carriage paid any station in Great Britain.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 11d. to 1s. 11¾d. per lb., less 5%.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, MOLYBDIC.—5s. 3d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 7d. per lb. Technical.—1s. to 1s. 2d. per lb.

ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.

ACID, TARTARIC.—1s. 4d. per lb., less 5%.

ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.

AMIDOL.—7s. 6d. to 9s. per lb., d/d.

AMIDOPYRIN.—7s. 9d. to 8s. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.

AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.

AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½ cwt. lots. Packages extra. Special prices for quantities and contracts.

ATROPHINE SULPHATE.—9s. per oz.

BARBITONE —5s. 9d. to 6s. per lb.

BENZONAPHTHOL.—3s. to 3s. 3d. per lb. spot.

BISMUTH CARBONATE.—8s. 9d. per lb.

BISMUTH CITRATE.—8s. 3d. per lb.

BISMUTH SALICYLATE.—8s. 3d. per lb.

BISMUTH SUBNITRATE.—7s. 6d. per lb.

BISMUTH NITRATE.—Cryst. 5s. 3d. per lb.

BISMUTH OXIDE.—11s. 3d. per lb.

BISMUTH SUBCHLORIDE.—10s. 3d. per lb.

BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.

BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W Qts. 11d. per lb.

BORAX B.P.—Crystal, £20 per ton; powder, £21 per ton. Packed in 1- or 2-cwt. bags carriage paid any station in Great Britain.

BROMIDES.—Ammonium, 1s. 11½d. per lb.; potassium, 1s. 8½d. per lb.; granular, 1s. 7¾d. per lb.; sodium, 1s. 10½d. per lb. Prices for 1 cwt. lots.

CALCIUM LACTATE.—B.P., 1s. 2d. to 1s. 3d per lb., in 1-cwt. lots.

CAMPHOR.—Refined flowers, 3s. 3d. to 3s. 4d. per lb., according to quantity; also special contract prices.

CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.

CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

ETHERS.—S.G. ·730—11d. to 1s. per lb., according to quantity other gravities at proportionate prices.

FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.

GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.

HEXAMINE.—2s. 3d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. Winchesters, 2s. 11d. per gall. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 4s. per gall.

HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.

IRON AMMONIUM CITRATE.—B.P., 2s. 8d. to 2s. 9d. per lb. Green, 2s. 10d. to 3s. per lb. U.S.P., 2s. 7d. to 2s. 10d. per lb.

IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.

IRON QUININE CITRATE.—B.P., 8¾d. to 9¼d. per oz., according to quantity.

MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.

MENTHOL.—A.B.R. recrystallised B.P., 18s. 6d. per lb. net; Synthetic, 9s. 6d. to 11s. per lb.; Synthetic detached crystals 9s. 6d. to 12s. 6d. per lb., according to quantity; Liquid (95%), 9s. per lb.

MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.

METHYL SALICYLATE.—1s. 6d. to 1s. 8d. per lb.

METHYL SULPHONAL.—18s. 6d. to 20s. per lb.

METOL.—9s. to 11s. 6d. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. per lb. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 2½d. to 3s. 9d. per lb.

PHENAZONE.—5s. 11d. to 6s. 1½d. per lb.

PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—104s. per cwt., less 2½ per cent.

POTASSIUM CITRATE.—B.P.C., 2s. 6d. per lb. in 28 lb. lots. Smaller quantities 1d. per lb. more.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.

QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins.

RESORCIN.—2s. 10d. to 3s. per lb., spot.

SACCHARIN.—43s. 6d. per lb.

SALOL.—2s. 3d. to 2s. 6d. per lb.

SODIUM BENZOATE, B.P.—1s. 8d. to 1s. 11d. per lb.

SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—2s. 2d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 6d. per lb. Prices for 28 lb. lots. Smaller quantities 1d. per lb. more.

SODIUM FERROCYANIDE.—4d. per lb., carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—100s. per cwt. Crystals, 5s. per cwt. extra.

SODIUM SALICYLATE.—Powder, 2s. 2d. to 2s. 4d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 1d. per lb.

SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.

SULPHONAL.—9s. 6d. to 10s. per lb.

TARTAR EMETIC, B.P.—Crystal or powder, 2s. 1d. to 2s. 3d. per lb.

THYMOL.—Puriss., 9s. 1d. to 9s. 4d. per lb., according to quantity. Firmer. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. 6d. per lb.

AMYL BUTYRATE.—5s. per lb.

AMYL CINNAMIC ALDEHYDE.—12s. 6d. per lb.

AMYL SALICYLATE.—2s. 9d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. per lb.

BENZYL BENZOATE.—2s. 3d. per lb.

CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.

COUMARIN.—8s. 9d. per lb.

CITRONELLOL.—9s. per lb.

CITRAL.—8s. per lb.

ETHYL CINNAMATE.—6s. 6d. per lb.

ETHYL PHTHALATE.—2s. 9d. per lb.

EUGENOL.—11s. 3d. per lb.

GERANIOL (PALMAROSA).—19s. per lb.

GERANIOL.—7s. 6d. to 10s. per lb.

HELIOTROPINE.—6s. 9d. per lb.

ISO EUGENOL.—12s. 6d. per lb.

LINALOL.—Ex Bois de Rose, 12s. per lb. Ex Shui Oil, 10s. per lb.

LINALYL ACETATE.—Ex Bois de Rose, 15s. per lb. Ex Shui Oil, 12s. per lb.

PHENYL ETHYL ACETATE.—11s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—48s. per lb.

SAFROL.—2s. 3d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN, EX CLOVE OIL.—14s. to 15s. per lb. Ex Guaiacol, 12s. 9d. to 14s. per lb.

Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.

ANISE OIL.—4s. per lb.

BERGAMOT OIL.—14s. per lb.

BOURBON GERANIUM OIL.—18s. 6d. per lb.

CAMPHOR OIL, WHITE.—160s. per lb.

CASSIA OIL, 80/85%.—5s. 3d. per lb.

CINNAMON OIL LEAF.—8s. 6d. per oz.

CLOVE OIL (90/92%).—8s. per lb.

EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—Mont Blanc, 38/40%, 13s. 6d. per lb.

LEMON OIL.—11s. 6d. per lb.

LEMONGRASS OIL.—4s. per lb.

PALMA ROSA.—12s. per lb.

PEPPERMINT OIL.—English, 70s. per lb.; Wayne County, 15s. 6d. per lb.; Japanese, 5s. 9d. per lb.

PETITGRAIN.—8s. 3d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, December 12, 1929.

THERE is very little change to report during the current week. Business has been steady and export business up to the average.

General Chemicals

ACETONE is firm at £76 10s. to £85 per ton, according to quantity, and in regular demand.

ACID ACETIC remains steady at £36 10s. per ton for 80% technical and £1 per ton extra for 80% edible.

ACID CITRIC continues slow at 2s. 1½d. per lb., less 5%.

ACID LACTIC is steady at £43 per ton for the 50% by weight pale qualities.

ACID OXALIC.—The firmer tendency continues at £30 7s. 6d. to £32 per ton, according to quantity. Demand is steady.

ACID TARTARIC.—The demand has been quite good during this week, with price a little easier at 1s. 4½d. to 1s. 4¾d. per lb., less 5%.

ALUMINA SULPHATE is in brisk demand at £8 to £8 5s. per ton for 17–18% iron-free quality.

ARSENIC is steady at £16 17s. 6d. per ton, free on rails mines.

BORAX is in good request at £13 per ton.

CREAM OF TARTAR is steady at about £104 per ton for 99–100% B.P. quality, and in fair demand.

COPPER SULPHATE is very firm at £28 per ton, less 5%.

FORMALDEHYDE is in good request and firm at £36.

LEAD ACETATE.—Unchanged at £44 per ton for white, with brown at £1 per ton less.

LEAD NITRATE is in steady demand at £33 15s. per ton.

LIME ACETATE is unchanged.

LITHOPONE.—Firm at £19 15s. to £23 per ton, according to quantity.

POTASSIUM CARBONATE.—Firm at £27 for 96–98% best quality.

CHLORATE OF POTASH.—The increased demand continues, and price is firm at about £30 per ton.

PERMANGANATE OF POTASH is very firm at 5½d. per lb. for the B.P. needle crystals.

SODIUM ACETATE is firm at £22 to £22 10s. per ton, and in good demand.

SODIUM BICHROMATE is unchanged at 3⅝d. per lb., with the usual rebates for contracts, with a considerable demand.

SODIUM HYPO COMMERCIAL.—£8 10s. to £9 per ton. Photographic Crystals, £14 10s. to £15 per ton.

SODIUM NITRITE is steady at £20 per ton, and in good request.

SODIUM PRUSSIATE.—Firm at 4¾d. per lb. to 5¼d. per lb., according to quantity.

SODIUM SULPHIDE is unchanged and firm.

TARTAR EMETIC.—11d. per lb., and in steady request.

ZINC SULPHATE.—Firm at £13 10s. per ton.

Coal Tar Products

The coal tar products market remains quiet, with little change to report in regard to prices from last week, with the exception of naphthalene, which is, if anything, weaker.

MOTOR BENZOL remains firm at about 1s. 5½d. to 1s. 6d. per gallon, f.o.r.

SOLVENT NAPHTHA is unchanged at about 1s. 2½d. to 1s. 3d. per gallon, f.o.r.

HEAVY NAPHTHA is quoted at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL remains at 3d. to 3¼d. per gallon on rails in the North, and at 4d. to 4¼d. per gallon in London.

NAPHTHALENES.—The fire-lighter quality is quoted at £3 10s. to £3 15s. per ton, the 74/76 quality at £4 to £4 5s. per ton, while the 76/78 quality remains unchanged at about £5 per ton.

PITCH.—The nominal price remains at 47s. 6d., but the weakness of the market is becoming accentuated.

Nitrogen Products

Sulphate of Ammonia.—Very little interest is displayed in this product. The market continues weak, and prices tend to sag. On account of the greater supplies available this year, buyers seem to be in no hurry to cover their requirements for the spring season.

Home.—It is reported that British producers have fixed the following prices for the next six months :—January, £10 ; February/June, £10 2s. per ton, delivered to consumers' nearest station in 6-ton lots. This awaits confirmation. Now that higher prices are announced for these months, it is anticipated that some of the larger merchants will purchase for December delivery.

Nitrate of Soda.—There is no change to report.

Latest Oil Prices

LONDON, December 11.—LINSEED OIL was easy at 20s. to 12s. 6d. per ton decline. Spot, ex mill, £45 ; December, £41 5s. ; January-April, £39 5s. ; and May-August, £37 2s. 6d. naked. RAPEOIL was inactive. Crude-extracted, £42 10s. ; Technical refined, £44, naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £29 ; refined common edible, £34 ; and deodorized, £36, naked, ex mill. TURPENTINE was steady at 3d. per cwt. advance. American spot, 42s. 9d. ; and January-April, 43s. 9d.

HULL.—LINSEED OIL.—Spot, £44 ; December, £43 15s. ; January-April, £42 ; May-August, £38 5s. per ton, naked. COTTON OIL.—Egyptian crude, spot, £29 10s. ; December, £29 ; edible refined spot, £32 10s. ; technical, spot, £32 ; deodorized, spot £34 10s.-per ton, naked. PALM KERNEL OIL.—Crude 5½ per cent. spot, £32 10s. per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £35 10s. ; deodorized, £39 10s. per ton. SOYA OIL.—Extracted and crushed, spot, £31 ; deodorized, spot, £34 10s. RAPE OIL.—Crushed-extracted, spot, £41 ; refined, spot, £43 per ton. TURPENTINE, COD OIL, and CASTOR OIL unchanged.

South Wales By-Products

SOUTH WALES by-product activities remain moderate. The demand for pitch has fallen off, and there is very little buying, with quotations ranging from 47s. to 49s. per ton delivered. Creosote remains weak at 3d. to 4½d. per gallon, but motor benzol has a slightly better demand. Road tar is weaker at 11s. to 13s. per 40-gallon barrel. Sulphate of ammonia is being quoted at £9 17s. per ton for current home delivery, but there is no record of any buying. Refined tars have a steady and fairly good call, with quotations for coke-oven and gasworks tar unchanged. Solvent and heavy naphthas are unchanged. Patent fuel and coke shipments are slightly better, but are still far from satisfactory ; quotations in Cardiff, Swansea and Newport are unchanged.

Scottish Coal Tar Products

THERE is practically no change in market conditions during the week. Pitch and tar are still in steady demand for forward delivery, particularly the latter, and fair quantities have been sold at to-day's level. Cresylic is slightly easier in price, but stocks are low.

Cresylic acid.—The demand is on the wane at present, and values have dropped in sympathy with the English market. Pale 99/100% is 2s. to 2s. 2d. ; Pale 97/99%, 1s. 10½d. to 1s. 11½d. ; Dark 97/99%, 1s. 9d. to 1s. 10d. High-boiling acid is very weak at 2s. to 2s. 2d. The aforementioned prices are per gallon, free on rails works in buyers' packages.

Carbolic sixties.—Nominally lower at 2s. 5d. to 2s. 7d. per gallon.

Creosote oil.—There is very little business at present. Quoted prices could be reduced for large quantities. Specification oil is 4d. to 4½d. per gallon, gas works ordinary 3d. to 3¼d. per gallon, and washed oil 3½d. to 3⅝d. per gallon.

Coal tar pitch.—Prices in Scotland are firm, owing to shortage of supplies. Quotations are as follows :—Coke oven and horizontal, 52s. 6d. to 55s. per ton ; vertical, 50s. to 52s. 6d. per ton. The nominal export prices are about 5s. per ton less.

Blast furnace pitch is unchanged at 30s. per ton, rails works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined coal tar is firm, and contracts have already been made at 3¾d. to 4d. per gallon, rails works in buyers' packages.

Blast furnace tar is unaltered at 2¾d. per gallon, ex works, naked.

Crude naphtha is weaker at 4¾d. to 5¾d. per gallon.

Water white products are still quiet, with prices easy. Solvent 90/160 is 1s. 1d. to 1s. 2d. ; heavy solvent 90/190 1s. to 1s. 0½d., benzol 1s. 5d. to 1s. 5½d., all per gallon, at makers' works.

Reduction in Price of Citrates

MAY AND BAKER, LTD., of Battersea, London, announce reductions in the price of the following :—Potassium citrate, sodium citrate, iron citrate and ammonium, and iron citrate and quinine.

Overseas Chemical Trade in November

As we go to press, the Board of Trade Returns for November have appeared. Imports of chemicals, drugs, dyes and colours for the month were valued at £1,368,826, a decrease of £117,216 on November, 1928 ; exports were valued at £2,560,495, an increase of £266,107 ; and re-exports of £78,051, a decrease of £21,648. For the eleven months ended November 30, imports were valued at £15,374,814, an increase of £1,282,834 on the corresponding period of 1928 ; exports were valued at £24,048,006, an increase of £664,215 ; and re-exports at £877,738, a decrease of £67,692.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, December 11, 1929.

INQUIRY for heavy chemicals remains fairly satisfactory, and there has been a good deal of business placed, particularly on contract for delivery over next year. Buyers seem to have more confidence than at this time last year, and there has been little difficulty in fixing up business on about the same levels as those ruling during the past few months. There are no appreciable changes in prices to report.

Industrial Chemicals

ACETONE, B.G.S.—£76 10s. to £85 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—This material is still scarce for immediate supply, but prices remain unchanged as follows: 98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £37 10s. per ton, ex wharf; 80% technical, £37 10s. per ton, ex wharf.

ACID BORIC.—Crystals, granulated or small flakes, £30 per ton. Powder, £32 per ton, packed in bags, carriage paid U.K. stations. There are a few fairly cheap offers made from the Continent.

ACID CARBOLIC, ICE CRYSTALS.—Prompt delivery difficult to obtain and prices quoted for early delivery round about 8d. per lb., delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Quoted 2s. 2d. per lb., less 5%, ex store, prompt delivery. Rather cheaper offers for early delivery from the Continent.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy; dearsenicated quality, 5s. 6d. per carboy, ex works, full wagon loads.

ACID NITRIC, 80° QUALITY.—£24 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—On offer at about 3¼d. per lb., ex store. Offered from the Continent at 3¼d. per lb., ex wharf.

ACID SULPHURIC.—£2 15s. per ton ex works for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC, B.P. CRYSTALS.—Quoted 1s. 5d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. 4½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £7 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal about 2s. 6d. per ton less.

AMMONIA, ANHYDROUS.—Quoted 7½d. per lb., carriage paid. Containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton, powdered £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material quoted £37 per ton, ex wharf. On offer for prompt shipment from China at £34 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Now quoted £18 per ton, ex wharf, prompt despatch from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 12s. 6d. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price £4 5s. per ton to £4 15s. per ton, according to quantity and point of delivery. Continental material on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works, or £4 12s. 6d. per ton f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Remains steady at about £36 10s. per ton, ex works.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 5s. per ton, ex wharf.

LEAD, RED.—Price now £37 10s. per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £37 10s. per ton, c.i.f. U.K. ports.

LEAD ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality 64 O.P. quoted 1s. 4d. per gallon, less 2½%, delivered.

POTASSIUM BICHROMATE.—Quoted 4⅜d. per lb. delivered U.K. or c.i.f. Irish ports, with an allowance of 2½% for minimum 2½ tons to be taken.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton ex store. Offered from the Continent at £25 5s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Quoted £25 10s. per ton ex wharf. Crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £19 2s. 6d. per ton c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA, CAUSTIC.—Powdered 98/99% £17 10s. per ton in drums, £18 15s. per ton in casks. Solid 76/77% £14 10s. per ton in drums, and £14 12s. 6d. per ton for 70/75% in drums, all carriage paid buyers' stations, minimum 4-ton lots, for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅞d. per lb. delivered buyers' premises with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or Pea quality 27s. 6d. per ton extra. Light soda ash £7 1s. 3d. per ton ex quay, minimum 4-ton lots with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots. Prices for this year unchanged.

SODIUM NITRATE.—Chilean producers are now offering at £9 9s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, but demand in the meantime is small.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 50s. per ton, ex works, 52s. 6d. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption. Solid 60/62% £9 per ton. Broken 60/62% £10 per ton. Crystals 30/32% £7 2s. 6d. per ton delivered buyers' works on contract, minimum 4-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton: rock, £10 7s. 6d. per ton; ground American, £9 5s. per ton; ex store.

ZINC CHLORIDE, 98%.—British material now offered at round about £20 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £10 per ton, ex wharf.

NOTE.—Please note that the above prices are for bulk business and are not to be taken as applicable to small parcels.

The Cotton Research Association

MR. G. NUTTALL, of Farnworth, the new president of the British Cotton Research Association, presenting the prizes at Manchester on Saturday, December 7, to the successful competitors under the Textile Institute's annual competitions in design for woven fabrics and yarns, emphasised the great importance of education and research if the British textile industry is to hold its own in the face of intensifying foreign rivalry. The Research Institute at Didsbury he said, had an equipment and staff which was unique in the world, and it was now being improved by the building of new workshops which were to be the counterpart of the laboratories. A great deal of fundamental research had gone on, but the place was inundated with problems received from the spinning and weaving traders, so that it was impossible to keep pace with them. The new machinery rooms would greatly improve the equipment. The whole industry benefited by the discoveries of research, even if individual firms doubted whether it was worthy of their support to the extent of a yearly subscription of £5 per thousand looms. It was the county's greatest hope to-day.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, December 12, 1929.

Due allowance being made for the unsatisfactory state of the textile and allied industries in the Lancashire district, a fair amount of forward buying interest has been displayed on this market during the past week, and in the aggregate good orders are reported to have been booked for delivery over next year. Chemical prices are steady on the whole, with transactions for prompt delivery on a relatively moderate scale.

Heavy Chemicals

Chlorate of soda this week has been a rather quiet section, with offers at round 2¾d. per lb. Bicarbonate of soda keeps firm and is in fairly active inquiry at £10 10s. per ton, with alkali in moderate demand on the basis of £6 per ton. A quiet trade is passing in the case of phosphate of soda, values of which are reasonably steady at about £11 per ton. With regard to caustic soda, there is a regular call for this material at from £12 15s. to £14 per ton, in contract parcels. Prussiate of soda continues very firm at from 4¾d. to 5¼d. per lb., according to quantity, and buying interest in this section keeps up at a fairly satisfactory level. There is a moderate demand about for sulphide of sodium at £10 to £14 per ton for the 60–65 per cent. concentrated quality, and from £8 2s. 6d. to £9 2s. 6d. per ton for crystals, all in contracts. Bichromate of soda is well maintained, and a fair amount of business is being put through on the basis of 3⅝d. per lb. for contract parcels. Saltcake is only in moderate request at the moment, but values are reasonably steady at about £2 17s. 6d. per ton. Hyposulphite of soda is on the quiet side, with offers of the commercial quality at about £9 5s. per ton and of the photographic material at £15.

Caustic potash is attracting some attention, with current quotations at about £31 10s. per ton. With regard to carbonate of potash, prices in this section are well maintained, and a moderate demand is reported at £26 5s. per ton. Inquiry for permanganate of potash just now is rather quiet, but quotations are well held at from 5½d. to 5⅝d. per lb. for the B.P. grade and about 5¼d. per lb. for the commercial quality. Chlorate of potash is attracting a moderate amount of attention and prices are about unchanged on the week at 2⅞d. per lb. In the case of prussiate of potash, this meets with a fair amount of inquiry, and prices are quite firm at from 6¾d. to 7¼d. per lb., according to quantity. Contract offers of bichromate of potash are on the basis of 4⅜d. per lb., and a moderately active business in this material is being put through.

Nothing very important has been reported on this market during the past week so far as the demand for sulphate of copper is concerned, but values are fairly steady at from £26 15s. to £27 per ton, f.o.b. Arsenic is a quiet section, but offers keep up at about £16 per ton at the mines for white powdered, Cornish makes. The demand for nitrate of lead is on a relatively small scale at round £33 per ton, whilst acetate of lead is quiet at about £39 per ton for brown, and £40 for white. Quotations in the case of the acetates of lime show very little change on balance, the grey quality being on offer at £16 per ton and the brown at £7 15s.

Acids and Tar Products

A moderately active business is being put through in acetic acid and offers are quite firm at from £66 to £67 per ton for the glacial quality and £36 10s. for the 80 per cent. commercial. Citric acid is slow and easy in tendency, with current values at from 2s. to 2s. ½d. per lb. There has been a little business done in tartaric acid and prices are about unchanged at 1s. 4¼d. per lb. Oxalic acid is steady and in moderate request at about £1 13s. per cwt., ex store.

Among the by-products, pitch is maintained at 47s. 6d. per ton, f.o.b., and a moderate demand has been reported this week. Creosote oil is not very active either for home use or for shipment, with offers at round 4½d. per gallon, naked. Carbolic acid continues firm and fair sales are being made at 2s. 6d. per gallon, naked, for crude, and about 9½d. per lb., f.o.b., for prompt lots of crystals. Solvent naphtha meets with a quiet demand at 1s. 2d. per gallon.

Company News

Margarine Union.—At a meeting on Tuesday it was announced that an interim dividend of 4 per cent. would be paid on December 17. This is the same as a year ago.

Shawinigan Water and Power Co.—A dividend of $⅝ per share has been declared on the common stock for the quarter ending December 31, 1929, payable on January 10.

Tarmac.—The directors authorise the payment on January 1 next of a dividend on the 5½ per cent. cumulative preference shares in respect of the half-year ending December 31, 1929.

Power-Gas Corporation.—The accounts show a profit for the year to September 30, 1929, of £25,277. The directors have appropriated to reserve fund £5,000, leaving £20,277, to which is added £10,382 brought in, making £30,659. A dividend at the rate of 6 per cent per annum, less income tax, is recommended, carrying forward £12,659.

Sulphide Corporation.—The net profit for the year ended June 30, 1929, before providing for taxation, is £213,227. The directors recommend dividends of 15 per cent. on the preference shares and 15 per cent. on the ordinary shares, absorbing £157,500, placing £21,000 to reserve for contingencies and £25,000 to taxation reserve account, leaving £9,727 to be carried to accumulated profits account, subject to directors' percentage of profits.

Eastern Smelting Co.—For the year ended July 31, 1929, the net profits amount to £73,195 (against £77,165), and, after making provision for depreciation, etc., and including the amount brought forward, there remains £54,287. Interim dividends of 5 per cent. were paid on both classes of shares in June last and the directors now recommend a final dividend for the period of 7½ per cent. (less income tax) on the preferred ordinary shares £3,750, and a final dividend of 7½ per cent. (less income tax) on the ordinary shares £24,375, again making 12½ per cent. for year, carrying forward £26,162.

British Benzol and Coal Distillation.—The first report shows net expenditure from June 12, 1928 (date of incorporation), to October 31 last of £485. The works at Bedwas were started up on December 5, and are now producing coke and by-products. The whole of the plant is expected to be working to full capacity by the middle of January next. Contracts at satisfactory prices, it is stated, have been entered into for the disposal of the whole of the company's benzol and solvent naphtha for twelve months from December 1, 1929, and arrangements have been made for the disposal of the other by-products.

Margarine Union Meeting

Lever Agreement Sanctioned

An extraordinary general meeting of the Margarine Union, Ltd., was held on Tuesday at Union House, St. Martin's le-Grand, London, the Earl of Bessborough presiding.

The chairman said that a provisional agreement was concluded on September 2 with the Lever group (representing the entire issued ordinary share capital of Lever Brothers, Ltd.), for the purpose of securing complete co-operation in the working of their respective businesses between Lever Brothers Ltd., on the one hand, and Margarine Union, Ltd., and N. V. Margarine Unie, on the other hand. The name of the Margarine Union, Ltd., would be altered to Unilever, Ltd., and that of N.V. Margarine Unie to N.V. Unilever.

Since the amalgamation became effective as from January 1, 1930, it was necessary to increase the capital of Margarine Union, Ltd., before that date, so as to be able to place the Lever group in possession of the shares in that company to which they would become entitled under the terms of the agreement. It was, therefore, the principal object of the meeting to deal with the resolution by which the capital of their company was increased to £11,600,000, by the creation of an additional £1,000,000 7 per cent. preference share capital and an additional £6,500,000 ordinary share capital.

The resolution was carried unanimously, as was also a resolution to elect Mr. Victor Jurgens a director to fill the vacancy arising from the death of Mr. E. Jurgens.

At an extraordinary general meeting of N.V. Margarine Unie held on Tuesday in Rotterdam proposals to alter the articles in accordance with the requirements of the new Dutch Companies Act, and in connection with the agreement with the Lever group, were adopted.

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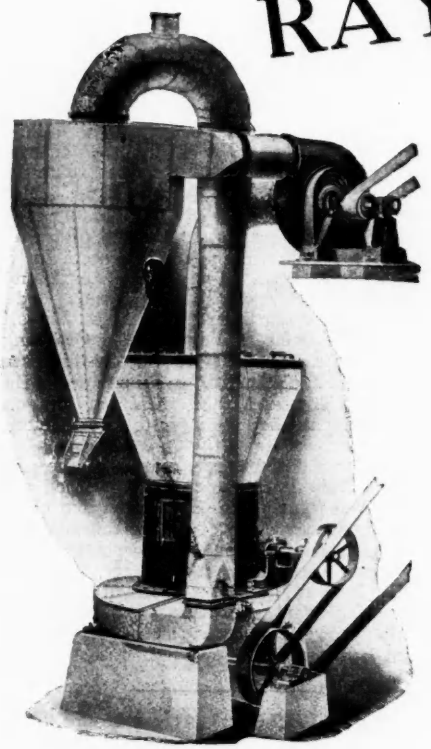

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Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

PALMERS DYE WORKS, 85, North Street, Guildford, dyers. (C.C., 14/12/29.) £10 5s. 1d. November 9.

Receiverships

JOHNSON AND WALTON, LTD. (R., 14/12/29.) A. Nicholson, Incorporated Accountant, of 89, Albion Street, Leeds, was appointed receiver and manager November 25, 1929, under powers contained in debenture dated January 13, 1925.

MACLO, LTD. (R., 14/12/29.) A. E. Ellison, C.A., of 16, Godliman Street, E.C.4, was appointed receiver on November 25, under powers contained in debenture dated June 21, 1929.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides and every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case, the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

AUZLENE, LTD., Bridlington, manufacturers of perfumes, etc. (M., 14/12/29.) Registered November 27, mortgage to Provincial Bank; charged on Medina House, Bridlington, etc. *Nil. December 31, 1928.

LAUTARO NITRATE CO., LTD., London, E.C. (M., 14/12/29.) Registered November 25, mortgage (supplemental to Trust Deed dated July 1, 1929, securing bonds for $32,000,000) charged on properties in Chile. *£2,462,405. July 12, 1928.

Satisfaction

BIERLEY CHEMICAL CO., LTD., Oakenshaw. (M.S., 14/12/29.) Satisfaction registered November 27, £5,000, registered April 2, 1919.

New Companies Registered

ADEPS LANÆ, LTD., 2, Chellow Street, Manchester Road, Bradford. Registered December 5. Capital, £100 in £1 shares. Manufacturers of natural fat, wool, grease, fatty acids and lanoline-grease, chemists, druggists, drysalters, oil and colour men, etc. Directors: J. L. Windle and F. E. Desmedt.

THE AMALGAMATED METAL CORPORATION, LTD., Princes House, Gresham Street, London. Registered as a "public" company on December 7. Nominal capital £5,000,000 in £1 shares (1,000,000 6 per cent. cumulative preference, 3,400,000 ordinary and the balance preference and/or ordinary). To acquire by purchase, exchange or otherwise, hold and dispose of the whole or any part of the share or loan capital or the assets or undertaking of the British Metal Corporation, Ltd., and Henry Gardner and Co., Ltd., or any other company, firm or person engaged in any of the businesses which this company is authorised to carry on and to subsidise or assist any such company as aforesaid, and (*b*) in any part of the world, and particularly in the British Empire, to carry on business as buyers, sellers and manufacturers of and dealers in ores, metals and minerals, rubber and produce merchants and treaters, miners, quarry owners, fertiliser manufacturers, research chemists, chemical manufacturers, manufacturers of fats, dips, sprays, vermifuges and fungicides, dye and pigment manufacturers and merchants, manufacturers of and dealers in lithopone, zinc, and other metallic oxides, makers of explosives and ammunition for military, sporting, mining and other purposes, iron and steel masters, brass and iron founders, engineers, etc. No contracts have been entered into, but it is proposed (*a*) to offer to shareholders of the British Metal Corporation, Ltd., one preference share of this company in exchange for each preference share, and two ordinary shares of this company in exchange for each ordinary share held by them, and (*b*) to offer to ordinary shareholders in Henry Gardner and Co., Ltd., eight ordinary shares of this company in exchange for every five ordinary shares held by them. Directors: Rt. Hon. Sir Auckland C. Geddes, Sir Evelyn A. Wallers, Chas. Vincent Sale, Capt. Oliver Lyttelton, Wm. S. Robinson, Henry Gardner, Walter Gardner, Arnold J. H. Smith.

TROWBRIDGE REFINING CO., LTD.—Registered December 4. Nominal capital £1,000 in £1 shares. Melters, refiners, manufacturers, exporters and importers of and dealers in tallow, fat, dripping, lard, compound, oil, glycerine, vaseline, wax and grease. Directors: F. Badham, R. H. Glaser and C. Wipfler.

Insecticide Case: Terms of Agreed Order

ON TUESDAY, in the Chancery Division, before Mr. Justice Eve, Mr. Moritz, K.C., mentioned the case of the Rex Research Corporation *v.* Trott, and said the parties had agreed an order subject to the approval of the Court. [The details of the action were mentioned in last week's issue of THE CHEMICAL AGE, p. 540.] The defendant had consented to an order that his servants and agents be restrained from making use of or disclosing to any person, firm or corporation any information relating to the formula, process or method of the tests employed in the manufacture of liquid insecticide obtained directly or indirectly from Fly-Tox Société Anonyme, or from Tibo Products (International), Ltd.; that the defendant be ordered to deliver up forthwith all samples, books, notes or memoranda, and other notes and documents relating to the manufacture of liquid insecticide, or anything containing information obtained directly or indirectly from the above companies. Counsel added that there was no claim for damages, but defendant had paid £50 towards the cost of the action.

Mr. Tookey, for the defendant, agreed to the order. He added that the defendant was much concerned about one thing, and that was to dispel the impression that the information was obtained at a time when the defendant was still engaged with the plaintiffs, and having got the information he then left them. Defendant said, in fact, that the association had been broken before he obtained the information. Negotiations had become strained.

His lordship approved the order, and said he had no doubt the defendant had done what was right in submitting to the order he had.

Quick-Locking Boltless Doors

IT is announced by Daniel Adamson and Co., Ltd., of Dukinfield, Manchester, that the company has obtained the sole selling and manufacturing rights for Great Britain and the British Empire, of the "Safety" quick locking boltless door. This announcement is of special interest to concerns considering the adoption of, or already possessing, horizontal or vertical pressure vessels, such as vulcanising pans, brick or timber drying chambers, kiers for chemical or bleaching purposes, tanks, wood-impregnating cylinders, etc. The door may be supplied and fitted to existing vessels already in service, or the company will build the complete pan, chamber, tank or kier, etc., to clients' own specification and requirements, or, alternatively, the vessel will be made to standard sizes and pressures. The door is entirely without bolts, and the following advantages are claimed for it:—Will open and close in a few seconds; economy in labour; no heat losses; no breakage of bolts; the locking parts work so freely that they ensure practical freedom from wear; reduced cooling down of the chamber due to quicker opening and closing, with consequent saving of wages and steam; no force or exertion when opening or closing, no long lever, and no spur gear or worm gear required; no rotation of the cover is necessary, thus protecting and prolonging the life of the rubber packing; and great safety in working.